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ABSTRACT

Between September 1990 and December 1991, Cabrillo College implemented the Math, Engineering, and Science Achievement (MESA) program to increase the number of underrepresented minority students enrolling in scientific disciplines at Cabrillo and subsequently transferring to four-year colleges. The initial program was targeted to 200 MESA members who were enrolled in 1 high school and 2 pre-college schools. Cabrillo also began to serve 100 minority community college students who were enrolled in math and science through the PACE (Pathways to Academic Excellence) program. Participating students visited university campuses and industry sites, were introduced to role models and mentors, and met with tutors and study groups. MESA provided academic enrichment, including weekly meetings, Saturday academies, and family math programs; and helped arrange for transfers and scholarships. Behind the scenes, articulation activities made sure that counselors were referring eligible students to the program, and that students could get into courses that were transferable. The community college proved to be a less-expensive route for talented pre-college MESA students, as well as an option for completing prerequisites for minorities not on the college preparatory track in high school. It also proved attractive to underrepresented minority women, who constituted 51% of the PACE participants. The MESA report is divided into five sections: (1) an outline of the history of MESA; (2) guidelines for starting a MESA center; (3) program objectives and activities; (4) observations and recommendations; and (5) appendixes, including a budget, job descriptions, MESA brochures and forms, a corporate funding proposal, and information about PACE. (JSP)

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How to Start a MESA Center at a Community College

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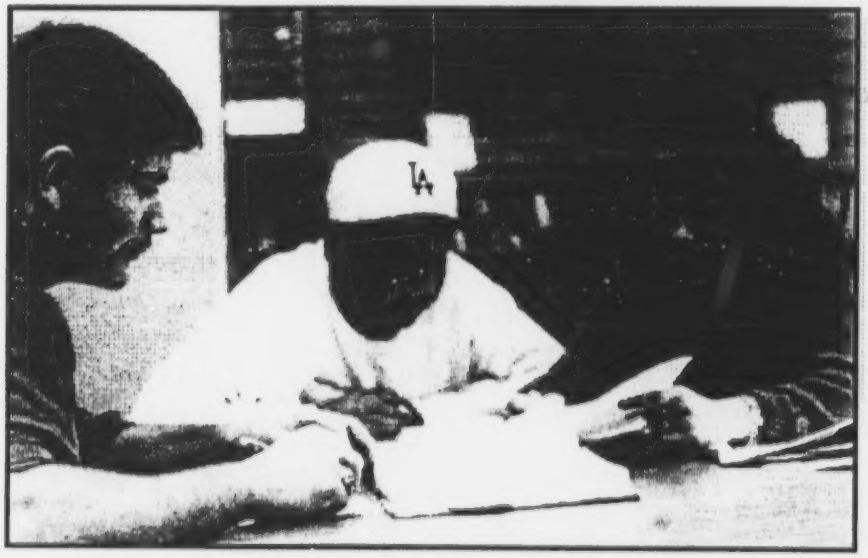
How to start a MESA Center at a Community College

Between September 1990 and December 1991, Cabrillo College implemented an academic outreach and support program for underrepresented students in math, science and engineering, through a grant funded by the Chancellor's Office of California Community Colleges. The mission of the program was to increase the number of underrepresented students who enrolled at Cabrillo and subsequently transferred to four-year colleges to study mathematics, science and engineering. In the process of developing, testing, and implementing this pilot program, Cabrillo made a number of findings which would be useful for all California Community Colleges contemplating a similar program.

This summary report details these findings, as well as progress in implementing the activities of the grant.



A summary report for the Chancellor's Office of California Community Colleges, by

Cabrillo College

6500 Soquel Drive, Aptos, CA 95003

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Abstract: Summary Report on the "Underrepresented minorities grant" to Cabrillo College

The MESA model (Math, Engineering, Science Achievement) developed at the University of California at Berkeley over the past 20 years proved that by offering services to pre–college students, as well as college students, we can increase underrepresented minorities' chances of entering a university and beginning a professional scientific career. Although 20 four–year universities serve as local MESA centers throughout the state, in 1987 Cabrillo College was the first community college to serve as a local MESA Center.

From August 1990 through December 1991, with funding from the Chancellor's Office of the California Community Colleges, the Cabrillo College program expanded from serving one high school (with 40 MESA members) to serving 160 MESA members in two pre–college schools. The college also began serving 100 minority community college students who were enrolled in math and science courses with a program called PACE (Pathways to Academic Excellence.)

The MESA/PACE program at Cabrillo College fostered the dream of having a scientific career by taking students to visit university campuses and industry sites, introducing them to role models and mentors. It helped retain students by providing tutors and study groups. It provided academic enrichment, including weekly meetings, Saturday academies, family math programs, and statewide MESA competition. It helped arrange for transfers and scholarships. Behind the scenes, articulation activities made sure that counselors were referring eligible students to the program, and that students could get into courses that were transferable.

The community college proved to be a less expensive alternative for talented MESA students, identified at the pre–college level, to continue in the "pathway," progressing toward a scientific career. In addition, the community college proved to be a new entrance to the pipeline for minorities who had not been on the college preparatory track in high school, and who needed to complete pre–requisites before they could take college level courses in science and math. It also provided a vehicle

to attract more minority women to a degree in the sciences — 51% of PACE members served by the center were minority women.

Surveys of student and faculty served by the Cabrillo College center indicate that the MESA/PACE program is successful in building a positive attitude toward math and science, and in helping make the dream of attending a four–year university an attainable reality.

Following **Section I**, which outlines the history of MESA in California and at Cabrillo College, **Section II** of this report provides a checklist for other community colleges who want to start a MESA center, including how to form the advisory committee, secure local funding, help pre–college schools start MESA programs, and serve community college students. **Section III** details results in each of the activities of the grant, while **Section IV** provides some observations based on this experience.

Section I: The History of MESA and the Cabrillo College PACE Program

Overview

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- Minorities Underrepresented in Math, Science, and Engineering
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- Funding by COCCC for Expansion

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- Pre–College Program
- College Program (PACE—Pathways to ACademic Excellence)

Introduction

Certain minorities (African American, Hispanic–Latino,[1] Native American, and Filipino American) continue to be underrepresented at the college level of math, science and engineering programs throughout California.[2] According to research conducted over the past 20 years, 60% of these students make the decision to drop out of school as early as grade seven or eight. However, when supported by an active outreach program that stimulates a belief that they can succeed academically and provides venues for success, 80% of these students develop skills and school records that allow them to enter four–year colleges. With continuing support at the college level, 62.2% of these student earn bachelor's degrees in a scientific field. Without it, 80% of them drop out of college. These statistics were provided by MESA (Math, Engineering, and Science Achievement), an outreach program developed by the University of California.[3]

Watsonville High School, with 75% Hispanic–Latino population, was a prime candidate for a MESA program, but found itself geographically distant from any existing MESA Center. In 1987, staff at Cabrillo College, Pajaro Valley Unified School District, and Watsonville High School jointly requested MESA Statewide to launch a pilot program at Watsonville High School, with Cabrillo College as the MESA Center—the first community college to serve in this capacity

This program grew in size, scope and success, making it apparent that similar efforts would be productive in other district schools, including middle and elementary schools. Cabrillo also wanted to provide services to its own community college students.

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[1] Also referred to as Mexican–American and/or Chicano in some source publications. All such reference in this report shall be defined to include U.S. citizens of South American, Central American, Mexican and Puerto Rican heritage.

[2] Currently representing 45% of the California population, these minorities provide only 3% of the college student population in these disciplines.

[3] MESA is a proprietary name of the MESA Statewide office. The term MESA is used generically to describe this type of outreach program. Section IV (Observations) will discuss differences between the MESA model and the Cabrillo College program.

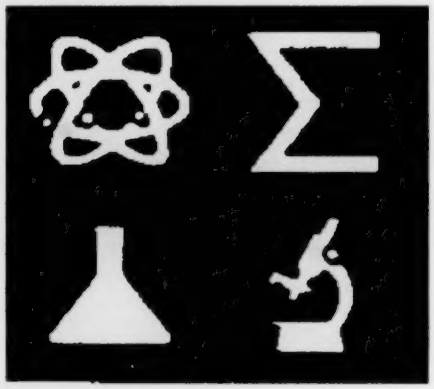
To assist in this expansion, Cabrillo College applied for and received a grant from the Chancellor's Office of California Community Colleges. This report summarizes the results of the activities of that grant, as well as recommendations for other community colleges contemplating the development of a similar program.

Following **Section I**, which outlines the history of MESA in California and at Cabrillo College, **Section II** of this report provides a checklist for other community colleges who want to start a MESA center, including how to form the advisory committee, secure local funding, help pre–college schools start MESA programs, and serve community college students. **Section III** details results in each of the activities of the grant, while **Section IV** provides some observations based on this experience.

History of MESA

In 1970, engineering professors at the University of California at Berkeley were becoming concerned that their student body did not reflect the ethnic diversity of

The MESA program began as an experiment in 1970, designed to encourage "underrepresented minorities" to attain college degrees in math and science.



the community around them. White and Asian races were well represented, but "Black and Hispanic" (as they were called in 1970) as well as Puerto Rican and Native American minorities were "underrepresented" at the university. When they began to investigate the causes for this imbalance, they found that many of the students in these groups were not entering college at all, often dropping out of high school as early as the ninth grade.

A pilot program was established at Oakland Technical High School, designed to reach out to "underrepresented minority student," to help them succeed in school

and in entering four–year colleges. The program was named Math, Engineering, and Science Achievement (MESA).

The MESA program today involves parents, community business people, mentors, students and faculty advisors in a variety of activities for both pre–college and college students, including study groups and tutorial sessions, guest speakers, MESA Day competitions, college and industry visitations, shadowing of active career professionals, regular "club" meetings, officer training, parent orientation and math training, scholarship, transfer, and fund–raising activities.

The usual MESA center is located at a four–year university, with separate directors for pre–college (MESA) and college (Minority Engineering Program—MEP) programs. The pre–college director provides support to area schools in the form of program planning, materials acquisition, secretarial support and fund–raising. The MEP director provides more direct support to targeted minority students at the university level. This support includes counseling, tutorial funding, coordination of study groups, and job–shadowing experience. The two directors coordinate the transition of pre–college students into the university setting.

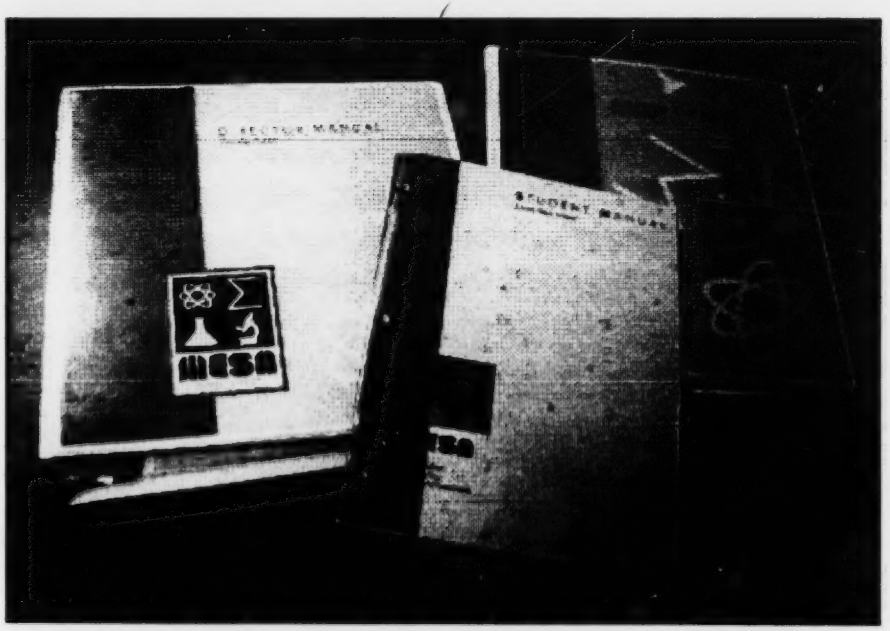
Though MESA had programs in 180 elementary, junior high/middle and high schools, and 20 four–year colleges, in 1989 it did not have much experience with the community college as a MESA center. Using the Chancellor's Office of California Community College grant, Cabrillo college has broken new ground and gained valuable insight into the challenges and assets of a MESA program at the community college level.

MESA at Cabrillo

At the pre–college level, Watsonville High School received substantial funding from a local sponsor, Granite Construction, with help from the MESA Regional Director and a member of the Cabrillo engineering faculty who was released for three teaching units a year through funding from MESA Statewide. The school district committed release time for the school advisor, and MESA statewide provided an advisors training session and materials. The Cabrillo center, funded by this grant, provided much needed secretarial support, as well as program planning and coordination, and funding for field trips. In addition, a scholarship program was provided by the Cabrillo Foundation.

By the second year of the grant, membership at the high school had grown to 80 students. In addition to all the MESA activities already listed, tutorial assistance was available for all students in the program. Each student was required to participate for two hours each week, one hour in a study group and one hour in a tutorial center which was staffed by classroom teachers. Of the first year seniors, 80% enrolled directly in four–year universities.

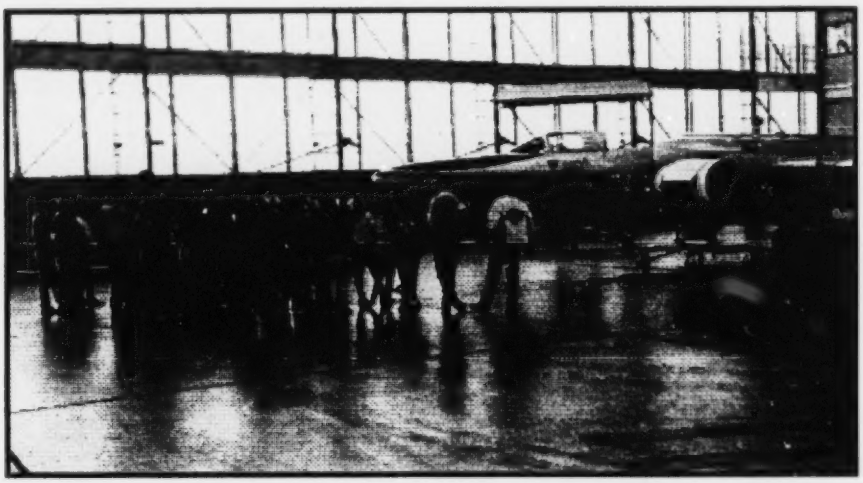
The statewide MESA program provides training and a variety of manuals for use in pre–college programs.



A second site, E.A. Hall Middle School, was assisted in creating its MESA program by the Cabrillo College center. Over 100 parents attended the initial orientation meeting, and 80 students were enrolled in the first year. The students learned applications of math and science concepts from weekly activity meetings, and from speakers from the local community. At the end of each semester, the students went on a field trip, including Long Marine Lab, NASA Ames Research facility, and the Exploratorium. (This was one of the "carrots" that kept the students coming to meetings!)

The students also got to see campuses such as UC Berkeley (during the spring regional MESA day competition) and California Polytechnic State University (during MESA officer training.)

Program participants were rewarded with many unique field trip opportunities.



An Awards Banquet at the end of the first year celebrated several triumphant achievements during the year, and reinforced the experience of success.

In its second year, student members, and 36 parents participated in Family Math, a program to involve parents in the learning process. Parents assisted with chaperoning, and students from the Cabrillo College program served as mentors for the middle school students in developing their science fair projects.

This type of exposure truly helped them believe that it was possible for them to go to a University and have a science–related career. It also built a connection with Cabrillo. These middle school students already discuss the possibility of completing their first two years at the less expensive community college, with a Transfer

Admission Agreement helping guarantee entry to some four–year universities if they succeed in meeting the required grade point averages. Their parents are prepared to support them in making the effort. Instead of planning to drop out, they are planning to succeed at this critical age.

Because of this success, five other local schools want to begin their own MESA program, including the elementary school that feeds E.A. Hall, two middle schools, and two high schools. Unfortunately, because the project was not refunded by the Chancellor's Office, these schools are not going to be able to begin at this time.

■ ■ ■

At the college level, qualifying students were identified using the admissions data base for all students who indicated their minority status and were enrolled in math, science, or engineering courses. The grant was used to communicate with these students, both by phone, newsletter, and campus meetings; to assist them in preparing for transfer and visiting four–year campuses; to fund tutors; and with the formation and evaluation of study groups. Of 700 qualifying students, 80 took advantage of these services. A comparison of the academic performance of the qualifying students compared to the entire population enrolled in these courses is included in the research described in activity 6.2.

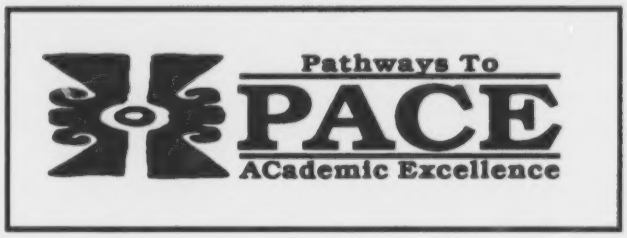
In addition to the MESA model, Dr. Uri Triesman of the Berkeley School of Engineering documented dramatic improvements in academic performance when the target population participated in an "honors" study group that developed group process skills as well as devoting an increased amount of time to exploration of course concepts. The ACademic Excellence (ACE) program at University of California at Santa Cruz (UCSC) uses study groups based on this model to provide support in the transition to more difficult college–level course work in the first two years at UCSC.

The Cabrillo program used elements of both MESA and ACE approaches quite successfully. Along the way, several quite unique and unexpected attributes of the Community College as a center for this type of outreach were identified.

Where MESA expected that the Community College would be just part of the pipeline, a way–station for students on their way from the high school program to

the four–year schools, it was instead discovered that **the primary beneficiaries of the college level program at Cabrillo** (dubbed Pathways to ACademic Excellence or PACE) **were students who had not considered themselves college material in high school, had not participated in MESA, and were only now ready to make the commitment to the hard work of preparing for a college degree.** While the program did attract more underrepresented minority students to Cabrillo math science and engineering programs (increasing from 13.6 to 15.5% of total students enrolled) these were new, and often older/re–entry recruits to the pipeline. The great majority of the students assisted as seniors in the high school program went directly into four–year universities. This may change six years from now, when the current middle school MESA students arrive at college age, but it is important to recognize the function of the community college as a new entrance to the pipeline.

The PACE Program was designed to fill a need at the Community College level.



Where ACE scheduled their students into study section hours as part of the UCSC curriculum, Cabrillo's commuter campus helped students find study groups around their work schedules. A computer program (FileMaker) helped with the logistics of matching eligible students in the same course by their available time to meet with each other and with tutors, but it didn't insure that the students put in longer hours of study, or provide them with a regular space to meet.

As discussed in the following section, it is recommend that this study group time be scheduled as part of the process of qualifying to receive tutorial funds. This is the most cost effective way to deliver tutorial, and builds the study group skills that students will need for a four–year campus.

The next few pages will review some of the steps to consider in planning a Community College MESA center, in order to help reduce the "learning curve," by taking advantage of the time invested by the Cabrillo College program. Included will be the procedure followed, as well as suggestions for changes.

Section II: How to Start a MESA Center at a Community College

By taking advantage of the time already invested by Cabrillo College, the "learning curve" inherent in beginning a new program can be reduced. Following are some of the steps to consider in planning a MESA Center at the community college level.

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- Recruiting an Advisory Committee
- Staffing and Resources

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- Advisor Recruitment
- Solicitation of Sponsorship
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- Study Groups and Tutors
- Field Trips
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- Parent Involvement
- Awards Banquet

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- Tutor/Facilitator Training
- Tutorial and Study groups
- Communication, Promotion, and Student Leadership
- Transfer Counseling
- Field Trips
- PACE Meetings
- Mentoring pre-college students

Center Administration

Funding

The Cabrillo College Center was funded (as previously stated) by a one year grant from the Chancellor's Office of California Community Colleges. It is recommended that the initial funding is considered to be seed money, to fund the time and correspondence needed to support on–going sponsors for the center. Appendix A shows a realistic budget, at 1992 dollars, of what it would cost to fund a center with four pre–college schools and a community college program.

Budget

The budget (detailed in Appendix A) was provided for an expansion grant proposal. Note the in–kind funding commitment by the college for overhead and staff functions. Also notable is the fact that funding is also provided for books and calculators; in many cases a $50 text put on reserve in the library can remove a high barrier to continuing in school.

Recruiting an Advisory Committee

Cabrillo's Committee included administrators from Cabrillo College and advisors from each of the pre–college schools involved, and this was extremely helpful in handling logistics of events, and linkages between the schools. The advisors can feel somewhat isolated, "out there on there own" at their school, so this time to network with other advisors is an important component. Membership in the Committee changed dramatically between one year and the next as staff in the schools and the center changed.

Monthly meetings would be advisable, and need to be scheduled at the beginning of the semester, when everyone is available. Ideally, the Regional Director for MESA can also plan to attend, and visit the schools while in town.

The Cabrillo MESA Center committee included only one member of the business community. This member was representing a company that contributed $10,000 to

the High School, acting as a primary MESA sponsor. The company had been recruited by the Regional Director of MESA and an engineering professor at Cabrillo.

As the Cabrillo College program continues, the college plans for half the members of the Committee to be from the business community. This will help to keep funding sources aware of progress and needs. In many cases, they also provide speakers, mentors, and job–shadowing opportunities.

MESA Statewide directors and advisors can meet with staff and students at their schools to aid in project planning.

Staffing and Resources

Staffing and Resources for the Center are indicated in the budget. In this first year, the attempt was made to make do with a part–time director, and part–time secretarial support, and found that this was unrealistic for the amount of work needed to start up a new MESA center, and maintain contacts and support with the schools.

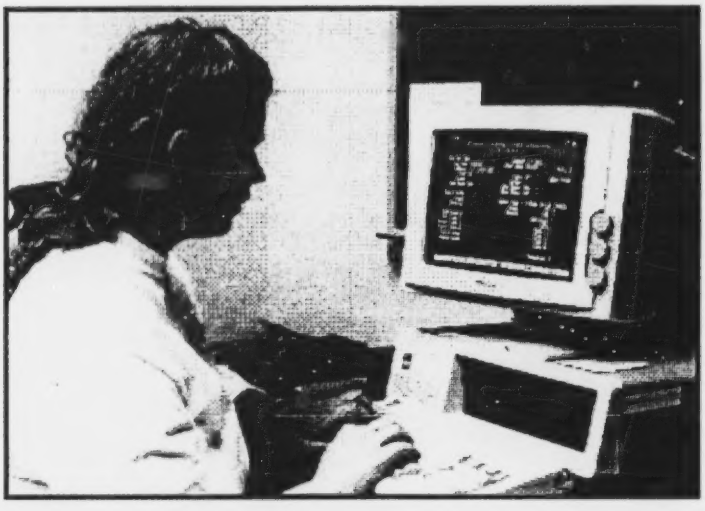
A full–time Center Director, ideally someone of the same ethnicity as the target minority in the area, is recommended. A job description for this critical role is provided in Appendix B.

The Center Director will need secretarial support that is familiar with computers and able to work well with students, and the inevitable administrative paperwork. A job description of this position is also included in Appendix B.

Both staff members need to be familiar with existing procedures and resources on campus. The Math Learning Center, EOPS, the Tutorial Committee, the Transfer

Center, the Retention committee, and Olà (Organization of Latino American students) all provided invaluable resources on the Cabrillo campus. By becoming familiar with what is already available, redundancy can be reduced and effectiveness of delivery of all programs can be enhanced.

Information for MESA's statewide database is entered locally at each center on an IBM PC.



Cabrillo's MESA Center used a new Math Learning center on campus to find and schedule tutors for students. In this final semester the center was housed in the Math Science Engineering division office, close to a copy machine, in a quiet room with a phone, with access to four computers and a printer. This allowed for private counseling sessions with students, and secure access to long distance on the office phone. However, this added additional work load to the division assistant.

The MESA Center does need to have a phone that can dial long distance to reach the MESA statewide office in Berkeley, the Regional Director, field trip destinations, and potential business sponsors. The phone needs to be automatically picked up by an answering machine or voice mail if no one is in the office.

Since about 50% of time in the office is spent on the computer, the MESA office does need to have access to at least one, preferably close to the phone. MESA statewide data base is on a PC, and the Macintosh was found to be most helpful with local correspondence, publications and data base.

The MESA Center makes copies on a regular basis, and should have access to a copy machine. In addition, mailings to participants and committee members will require supplies and postage.

Meeting with District and School Administrators

To start MESA in a new school, it is necessary to get support at the district level and the governing board. If their school has a high percentage of minorities, they may already have a vested interest in this type of project. The key is to get funding for a release period or stipend for the MESA advisor. In many districts, the unions are "working to the rule," and will frown on any faculty member doing extra work without compensation. Since the advisor role realistically takes 5 hours a week during the fall semester and 10 hours a week during the spring semester (when there are more Saturday sessions to prepare for the MESA Day regional competitions), plus evening sessions for parent meetings and field trip time, it is essential to get support in the form of this funding.

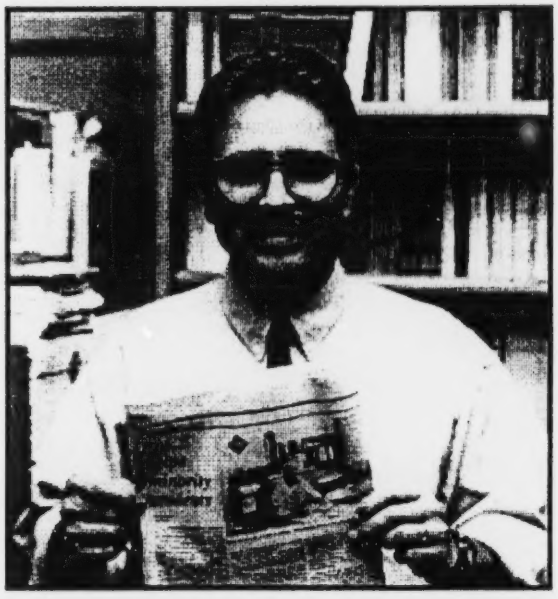
MESA does provide brochures and materials which describe their success to date, which can be helpful when the administrators in turn need to present this program to their board. Examples of MESA brochures can be found in Appendix C.

Advisor Recruitment

In selecting an advisor for the MESA program, it seems obvious to look for someone who already has demonstrated a good rapport with and a commitment to the minority students. They may be a math or science teacher, although counselors have also served in this role. **The advisor is absolutely key to the success of the program**; their enthusiasm and hard work will attract student members, and serve as a model for the skills they need to succeed in college and in the work force.

The advisor will be working with other faculty, parents, students, and resource speakers from the local college and the community who can work with the students not only math and science, but also on public speaking, writing, applying to colleges, etc. The advisor may set up study groups and coordinate tutorial service for MESA students. The advisor will also be gathering and conveying information about resources already available in the district, including counseling services, scholarships etc. They need to have good

The advisors for a MESA program, whether teachers or counselors, are a key ingredient in a successful program.



communication and networking skills, persistence, and the ability to maintain a program as a "self–starter."

Solicitation of Sponsorship

In addition to the funding for the advisor, each school will want to have funds for buses (field trips,) incentive prizes, scholarships, and other incidental expenses. As part of the forming of the center Advisory Committee, seek out large locally based businesses with a vested interest in potential employees in math–based professions. The first sponsor for Watsonville High School was Granite Construction Company. PG&E, Hewlett Packard, Pacific Bell, Rockwell International, ARCO and many others have all provided funding to other MESA schools throughout California in the past. An example of a proposal is provided in Appendix D.

MESA Training and Funding

MESA provides annual training for advisors in August. During this training, advisors get information on content materials to use during MESA meetings and for Saturday Academies, as well as general coaching on techniques to increase the chances of success for the MESA program at their school. **If at all possible, advisors should be recruited before this training, and funded for transportation to get there, as this provides them with the information they need.** All housing and training expenses are paid for by MESA and corporate sponsors.

MESA also provides training for student officers in the MESA organizations during the summer. They discuss the role of the officers, meeting management, fund–raising, and other techniques, which will be useful to the students in the conduct of their duties. Separate training is given for high school and junior high/middle school students, with most expenses covered by MESA.

MESA has a periodic meeting for Center Directors. The Regional Director or the statewide office can be contacted for further information.

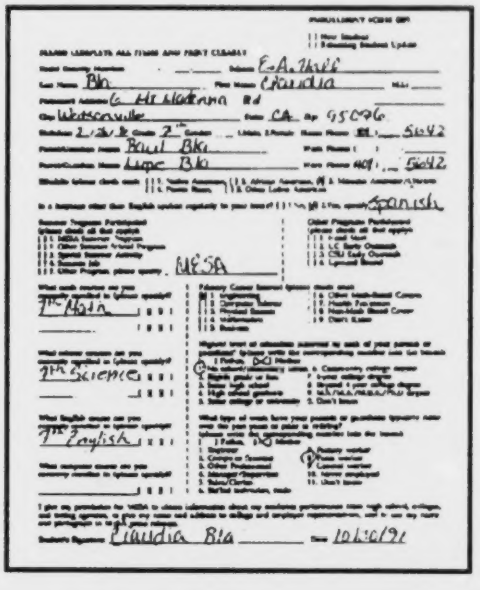
MESA Manuals

MESA provides three–ring binder manuals for Center Directors, and Advisors in High School and Middle School. These include all forms and procedures they have established. There are saddle stitched manuals for senior high school students, but some of the material is outdated. The Cabrillo center adapted and translated the student manual into Spanish for the orientation of middle school students and their parents.

Enrollment and Data Entry

Each student completes a MESA Enrollment Form (EF) at the beginning of the semester. At this time, MESA asks that the Centers or schools handle data entry into their PC format data base, and send the paper copies as well as a copy of the data base to the MESA statewide office. It took the Cabrillo program assistant about 20 hours to get set up, trained, and enter 160 forms.

The Information contained in the MESA Enrollment Forms is entered into a data base for use at both the local and statewide levels.



Study Groups and Tutors

It is recommend that tutorial support be provided through a study group format. At Watsonville High School, study groups met every morning before school started. Tutors met with students during this time and after school, on a regular basis. Funding for tutors was available through an existing program in the district, and the MESA advisor's classroom was used as the meeting place.

Field Trips

As mentioned in the introduction, field trips are the "carrots" that get the students to maintain regular meeting attendance. Generally, one field trip a month was planned, ranging from tours of local facilities to 10 hour trips to museums and universities in the region.

In addition, one of the most successful field trips was SMART DAY (Science and Math and Are Really Terrific), the acronym used for the Cabrillo College visitations by middle and high school students in Spring 1991. Cabrillo instructors provided experiments and hands–on activities for the students in the fields of engineering, physics, astronomy, math and electronics. Campus tours were led by Cabrillo PACE students, who also shared their educational career paths. Transportation was provided for the schools with larger numbers of participants.

On November 6, 1991 50 students from Watsonville High attended College Night Orientation at Cabrillo, with a special tour provided by Cabrillo PACE students. The transportation that allowed these students to attend the event was funded by this grant.

This kind of exposure helps the students develop an awareness of what college life would be like, and a connection to the local campus. The tours to engineering operations help them visualize themselves in a career based on math or science knowledge, and motivates them to work harder in their current studies.

MESA Day

Each spring, the students compete in a regional meeting called MESA Day. Usually held at a major university in the region, it allows the students to see a campus as well as enjoy a variety of events. (A copy of the categories, from the official contest rules, is on page 16.) The middle school students were lucky enough to participate

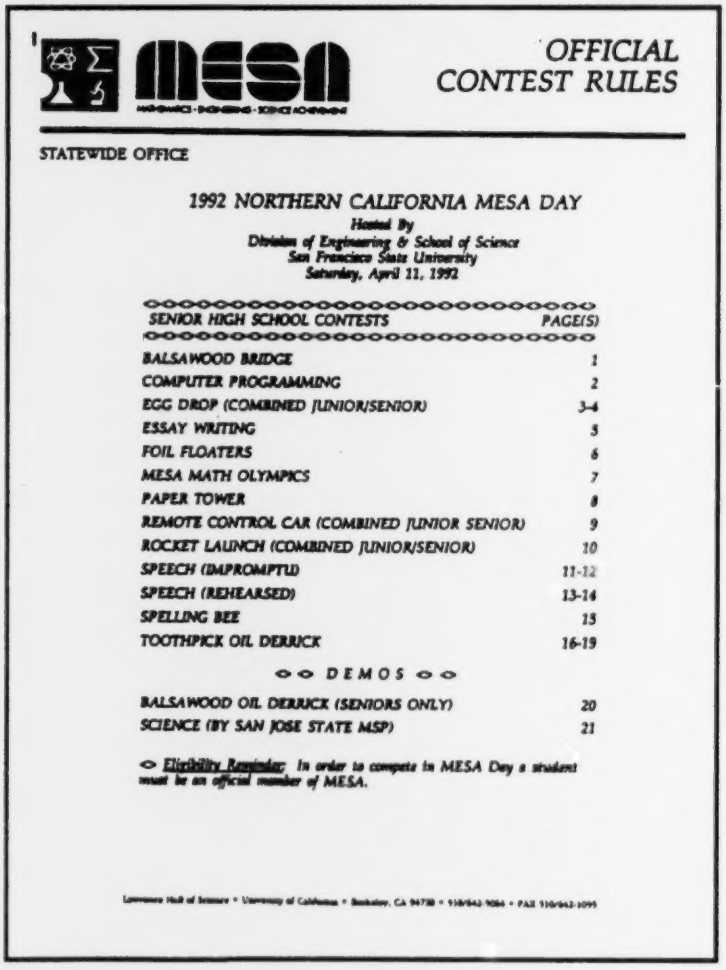
in a "Mini MESA Day" practice session put on by the Fresno Center. This let them see what the event would look like, and now they are highly motivated to participate in 1992.

PACE students and instructors from Cabrillo College helped the MESA students prepare their projects for competition.

Parent Involvement

Since parental expectations are a key variable with Hispanic–Latino students plans to stay in school, it was particularly pleasing to see the large turnout of parents in both of the Fall orientation sessions for the middle school. This is a critical age for deciding to work for achievement in school. At the high school, by contrast, the students don't want their parents to be involved. It is hoped that the parents who

MESA Day contests offer creative science–oriented challenges and give students a taste of life at a major university.



MESA

OFFICIAL CONTEST RULES

STATEWIDE OFFICE

1992 NORTHERN CALIFORNIA MESA DAY

Hosted By
Division of Engineering & School of Science
San Francisco State University
Saturday, April 11, 1992

SENIOR HIGH SCHOOL CONTESTS	*PAGE(S)*
BALSAWOOD BRIDGE	1
COMPUTER PROGRAMMING	2
EGG DROP (COMBINED JUNIOR/SENIOR)	3-4
ESSAY WRITING	5
FOIL FLOATERS	6
MESA MATH OLYMPICS	7
PAPER TOWER	8
REMOTE CONTROL CAR (COMBINED JUNIOR SENIOR)	9
ROCKET LAUNCH (COMBINED JUNIOR/SENIOR)	10
SPEECH (IMPROMPTU)	11-12
SPEECH (REHEARSED)	13-14
SPELLING BEE	15
TOOTHPICK OIL DERRICK	16-19
DEMOS	
BALSAWOOD OIL DERRICK (SENIORS ONLY)	20
SCIENCE (BY SAN JOSE STATE MSP)	21

Eligibility Reminder: In order to compete in MESA Day a student must be an official member of MESA.

How to start a MESA Center at a Community College, page 15

have escorted the field trips and helped with fund–raising at the middle school level will provide a nucleus for a parents group as their children join the high school MESA club.

In addition, 40 parents signed up for Family Math, a curriculum developed to help parents and children work on math together. The program was offered on five consecutive Wednesday nights, with the instructors and a translator paid by the project. In the future, this program may be offered through adult education, and a Spanish speaking instructor will be present.

Awards Banquet

In the spring of 1991, the Watsonville High School Awards Banquet was held on May 17th in the high school cafeteria. Parents of all MESA students were invited and about 75 people attended the event. The MESA Club gave a plaque to Vince Carrillo, representative of Granite Construction Company, in acknowledgment and appreciation of the Company's contributions to the MESA Club activities. All seniors were recognized for their contributions, in addition to those students who had won awards at MESA Day in April. Incentive awards and scholarships, donated by Granite Construction and the Cabrillo Foundation, were given to deserving students. Cabrillo project staff and Tony Garcia, MESA Regional Director, spoke at the banquet.

The E.A. Hall Middle School Awards Night was held on May 30th with more than 200 parents and students in attendance. Eugene Garcia, Dean of Social Sciences at UC Santa Cruz, spoke. Each student received a certificate recognizing participation in the MESA program and those who participated in MESA Day received an additional certificate.

As the certificates were awarded, each student shared a dream for the future. Without exception, the students indicated that they were planning on a college education, with the majority interested in engineering, science, law or teaching.

Study Groups Sections

Once the college has agreed to host a center, it may be useful to start immediately to arrange for study group meeting locations and sections in the Schedule of Classes. Since college schedules are set so far in advance, this may take up to a year. On a short–term basis, available classroom space in the vicinity of the Math Sciences buildings was reserved for study groups, and the study groups were formed directly with the PACE members.

Identifying Target Population

Enrollment ethnicity information and mailing labels for all minority students enrolled in Math, Science and Engineering division classes were obtained through Cabrillo College Computer Services. This population could also be screened for students who had already taken 30 units and had a 2.3 grade point average, who would be eligible for transfer.

In early efforts to identify qualifying minorities, faculty members were asked to identify them visually or go down class lists looking for Spanish sounding surnames; this was uncomfortable for faculty and inefficient at best. General announcements in mixed classes produced little response. However, when faculty suggested to individual students that they take advantage of the program's resources, they were most likely to get in touch with the campus office.

Faculty Orientation

Cabrillo has a staff development week prior to the start of school in which all faculty participate. The PACE/MESA program provided orientations during each of these weeks, including one session that addressed the entire faculty. In addition, the program director would meet with individual faculty to recruit students from their classes, and to help solve problems.

The majority of faculty were positive about the effort to provide support to minorities, but two areas of resistance to the program were identified. In some

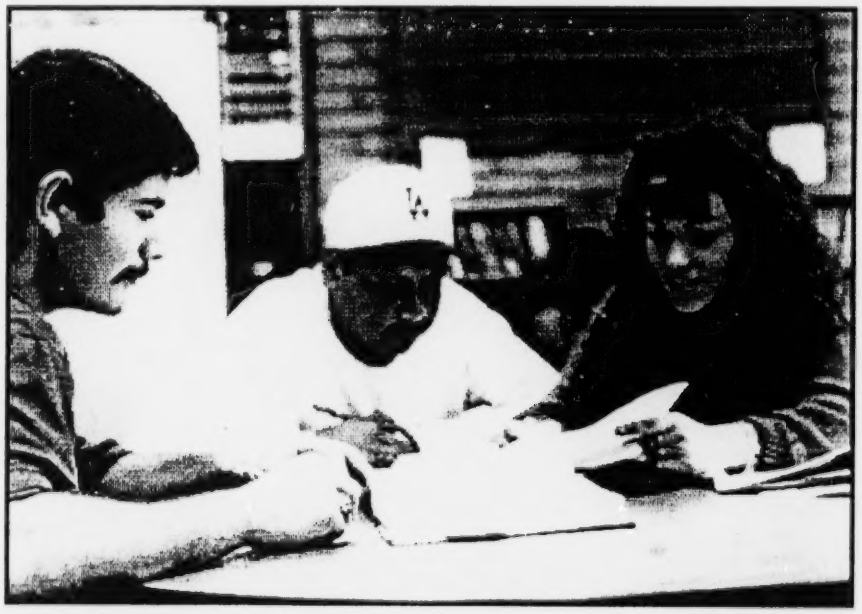
cases, the instructors felt all students should be assisted by need rather than by ethnicity. (At Cabrillo, the ACE model was followed to deal with this issue of fairness, allowing anyone to join a study group, as long as one member met the ethnicity requirements.) And in others, a few instructors were impatient with students that needed additional assistance, and felt they weren't "college material." This is where the college level program has to provide a safety net to help, especially in the transition into college and gaining the study skills needed. If left to "sink or swim," MESA has found 80% of these students will "sink," dropping out of college.

Tutor/Facilitator Training

The Cabrillo Math Learning Center did an excellent job of screening and hiring math and physics tutors. In addition, some special training in group dynamics is recommended for tutors who will be leading study groups. Training students to solve their own problems with a team is quite different than showing them how to work a problem.

Tutorial support in other areas was also provided, since a gifted math student may be held back by problems in understanding composition or anthropology.

Study groups and tutorial support promote academic success.

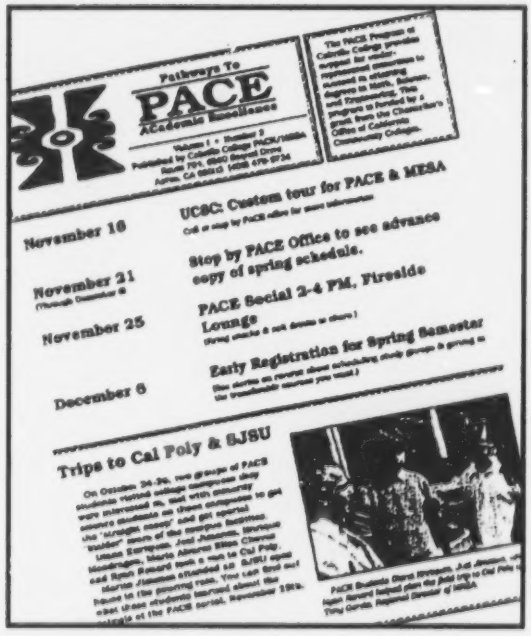


Tutorial and Study Groups

Efforts to provide tutorial support began in September, 1990. All math, science and engineering instructors were advised that one–to–one tutorial assistance was available to project–qualified students. If math help was needed, the students were referred first to the Math Learning Center, since tutorial help was available there on a daily basis. If additional support was required, tutoring was provided through the project. Tutoring was also provided through this project for classes in science and engineering.

Early on, very few students utilized the assistance, despite outreach efforts. To increase the program's effectiveness, student concerns were discussed with students,

Newsletters and flyers helped to publicize events and services, but personal contact proved to be more effective.



Pathways To
PACE
ACademic Excellence

November 16 — UCSC Custom tour for PACE & MESA

November 21 — Stop by PACE Office to see advance copy of spring schedule.

November 25 — PACE Social 2-4 PM, Fireside Lounge

December 6 — Early Registration for Spring Semester

Trips to Cal Poly & SJSU

tutors and instructors. The student view was that "only remedial students needed tutorial support". To address this concern, a new approach was developed, creating the PACE program to mimic the ACE "honors" program.

The college program was in Spring 1991 restructured to reflect a new philosophy and a variety of activity options under the acronym Pathways to ACademic Excellence (PACE). To remove the stigma of a "remedial program," PACE was defined as a program to support academic excellence. Project eligible students were contacted through a letter which was mailed or delivered to each student whom identified from

targeted math, science and engineering classes. Materials used in this outreach are included in Section V. Students were invited to schedule an appointment to learn more about the PACE program, which included the following activities:

■ **Tutorial Support**: Tutorial support was transformed to supplemental instruction. Students from two pilot classes were provided with a study group structure which included section leaders. In one class, the project director served as the section leader and in the other, Cabrillo student tutors became section leaders for the study groups.

■ **Study Groups**: Students were encouraged to form study groups with other students within the specific math/science/engineering sections in which they were enrolled. Teachers were notified that these students were interested in a study group collaboration so that they could make this available to other students in the section who might also want to work together. Teachers and students were reminded that tutorial assistance was available for PACE program participants if they felt that the support would be valuable. The Math Learning Center continued to be the first tutorial alternative for students in math classes.

■ **Career Visitations**: Students identified a career or area of interest and a start was made in contacting professionals in those areas to create a mentor link.

Communication, Promotion, and Student Leadership

At Cabrillo, it was found that phone communication, and person–to–person contact were much more effective than letters or newsletters. Flyers were handed out at registration, in some classes, and in the cafeteria by current PACE members. Certain members, who identified themselves by their enthusiasm, became central to passing on communications about opportunities for field trips, meetings, mentoring the pre–college students, etc. Identifying and working with these student leaders will be central to the success of a college level program.

Through the use of information sheets completed by the students it was also possible to sort for a variety of interests among members, and notify them about opportunities they would be particularly interested in.

Transfer Counseling

Cabrillo has an excellent Transfer Center that worked with PACE members on a priority basis to help them develop plans for transfer to four–year universities. As a relatively small campus, Cabrillo still has the 5th highest rate of transfer in the state.

Access to information regarding transfer requirements and procedures is especially important in a community college program.

Since this is an intrinsic objective for college level students, it may be helpful to require students to develop a plan with a counselor, and a Transfer Admission Agreement if available, as part of their qualification to continue receiving the Center's assistance in other areas.

Field trips

Cabrillo PACE students benefited from field trips to Universities and potential work sites. In most cases, they would not have received this exposure without the help of the monies and arrangements from the Cabrillo Center.

■ Four–year College Information/Visitations: During the initial PACE interview, students identified both schools and programs in which they were interested and some of the identified schools were contacted. Students were notified of four–year college activities and encouraged to visit individually or in small groups. Transportation was provided when possible.

PACE Meetings:

During the first semester, students had the opportunity to hear a guest speaker from an Engineering Department at a four–year college and to accompany the Program Director and high school students attending a mini–MESA Day. As with the tutorial program, there was limited student interest. Only three students came to hear the guest speaker and one student attended the mini–MESA Day.

By the third semester, 20 students came to orientation, but in general there was resistance to coming to meetings on Cabrillo's commuter campus.

Experience on four–year campuses has demonstrated the strong benefit of a sense of connection from regular weekly meetings. This may need to be required as part of belonging to PACE, or evolve out of the social clubs, such as Olà (Organization of Latino American students). Because of varying work schedules, meetings may need to take place at two or three different times during the week.

Mentoring Pre–College Students

Middle School/High School Mentor Program: Students from all of the high schools in Santa Cruz County were invited to participate in an activity based math/science

field day, called SMART DAY (Science and Math Are Really Terrific) on April 23rd. A second SMART DAY was held on May 4th for E. A. Hall Middle School students. Cabrillo PACE students volunteered at both SMART DAYs, where they led tours of the Cabrillo campus and shared their educational career paths.

In addition, members of PACE and Olà who had attended E.A. Hall spoke at the orientation for MESA students and parents, providing visible, tangible proof that the MESA students could go to college. They continued to work with the pre–college students on their field trips and preparation of science fair exhibits.

Section III: Grant Objectives, Activities and Results

Details of results for each objective and activity of the grant are provided in the following pages.

Objective 1 — Articulation 24
Objective 2 — Mentor and Family Support 29
Objective 3 — Supplemental Instruction 32
Objective 4 — MESA Activities 37
Objective 5 — Scholarship Program 40
Objective 6 — Management Component 41

Grant Objectives, Activities and Results

Objective 1: **To increase the number of students who are prepared and motivated to enter Cabrillo College and transfer to the University of California and California State University in the disciplines of mathematics, science and engineering, Cabrillo College will increase its articulation activities with high schools and four-year colleges.**

Activity 1.1: Establish Program Advisory Committee — Fall, 1990

The Program Advisory Committee, established Fall, 1990, is composed of the following representatives:
Claire Biancalana, Dean of Instruction, Cabrillo College
Ann Stephenson, Vice—President of Instruction, Cabrillo College
Caroline Keller, Program Director, Cabrillo College
Rich Hart, Engineering Instructor, Cabrillo College
Vince Carrillo, Controller, Granite Construction
Kathy Kailikole, ACE Program, University of California, Santa Cruz
Don Brown, MESA Advisor,E.A. Hall Middle School
Elio del Cañal, MESA Advisor,Watsonville High School
Rachel Keefe, Vice Principal,Watsonville High School
Tony Garcia, MESA Central Region Director

The committee met on December 18, 1990 at 3:30 p.m. to discuss the progress to date.

The committee, with Watsonville High School Math Department Chair Kathy Anderson replacing Elio Del Cañal, met again on April 30, 1991, to evaluate the progress of project activities and to make recommendations regarding the expenditure of project funds which are being carried over to Fall 1991. In addition, the committee recommended activities which should be considered in applying for an expansion grant for the project because of the successes to date.

On September 23, 1991, the Advisory Board met, with several new members:
Susan Claire, PACE/MESA Program Director, Cabrillo College
Donna Mekis, Transfer Center Director, Cabrillo College
Lynn Harlan, Articulation Officer, Cabrillo College
Francisco Poncé, Counselor/Matriculation, Cabrillo College
Wanda Garner, MSE Division Chair, Cabrillo College
Tony Calvo, Asst. Superintendent, PVUSD
Virginia Estrella, MEP, San Jose State University
Rafael Carnados and Marty Atkinson, ACE, UCSC
Catherine LaChance, Articulation, Cabrillo College
Jazim Rubaii, Math Lab Emir, Cabrillo College

The Advisory Board reviewed progress to date and the expansion grant proposal, and proposed a field trip to UCSC for all MESA students during the fall semester.

The final meeting of the Advisory Board took place on November 25, 1991. The board reviewed and made suggestions on the final summary report as well as making recommendations on means to continue some components of the program since the expansion grant was not approved.

Activity 1.2: Counselors' breakfast and seminar — Fall, 1990 (changed)

It was decided to hold the breakfast only during Spring 1991 so that counselors of project students could be advised of available program activities just prior to student registration for classes for Fall 1991. See Activity 1.5.

Activity 1.3: Training for Cabrillo College engineering and Watsonville Center counselors — Fall, 1990

The Program Director met with the administration of the Cabrillo College Watsonville Center, outlining project options and planning for the tutorial activities at the Watsonville Center.

Training for the counselor for the Watsonville Center was provided through several meetings where the project was described and strategies were developed for encouraging student participation.

Activity 1.4: Update mathematics, science, and engineering articulation agreements with Watsonville and Aptos High Schools — Fall 1990

Major articulation agreements in math and science were developed about four years ago with the Pajaro Valley Unified School District. To update the math agreement, an articulation meeting between the Cabrillo College Math and Engineering Departments and the Watsonville High School Math Department was held on March 11, 1991.

Activity 1.5: Counselor's breakfast — Spring 1991 (completed)

The Counselor's breakfast was held on March 15, 1991. At this meeting the project activities were outlined for all of the counselors in Santa Cruz County. Counselors were encouraged to identify students who could attend the high school level SMART DAY on April 23rd. In addition, they were asked to advise incoming program–eligible students about the Cabrillo PACE project.

On May 6th a follow–up meeting was held with the four Aptos High School counselors. Four Aptos students had signed up to participate in SMART DAY but they did not arrive at Cabrillo. The counselors indicated a willingness to encourage student participation in Fall 1991 SMART DAY activities. They also recommended that the project provide transportation as was provided for Santa Cruz and Watsonville High School students.

Several meetings were held with the bilingual School Community Coordinator at Santa Cruz High School, who then facilitated meetings with the Santa Cruz High students and encouraged their attendance at SMART DAY. In addition, he facilitated the student meeting with the representative from the Engineering Department at Sacramento State University.

Activity 1.6: Expand transfer guarantees and course articulation with University of California and California State University — Spring, 1991

Articulation agreements guarantee that the four–year campus will accept Cabrillo courses in lieu of their lower division courses so that there is no loss of credit. Articulation agreements are negotiated by faculty through the articulation

officer. Currently articulation is in place or pending in the the following areas of math, science and engineering:

University of California (Berkeley): biology, chemistry, computer science, engineering, mathematics, physics

University of California (Davis): biological sciences, chemistry, computer science, engineering, mathematics, physics

University of California (Santa Cruz): biology (general, marine, and psychobiology), chemistry, computer engineering, computer and information systems, mathematics, physics

California State University (Chico): biology, chemistry, computer science, mathematics, physics

California State University (Fresno): biology, chemistry, computer science, engineering, mathematics, physics

California State University (Long Beach): biology, chemistry, computer science, mathematics, physics

California State University (Sacramento) biology, chemistry, computer science, engineering, mathematics, physics

California State University (San Francisco): biology, chemistry, computer science, engineering, mathematics, physics

California State University (San Jose): biology, chemistry, computer science, engineering, mathematics, physics

Cal Poly (San Luis Obispo): biology, chemistry, computer science, engineering, mathematics, physics.

Cabrillo also has articulation in other sciences, including geology, meteorology, environmental studies, etc. In addition, Transfer Admission Agreements provide for contracts which guarantee admission to UC Davis and Santa Cruz,

CSU Chico, Sacramento, San Francisco and San Jose, as well as Santa Clara University.

Activity 1.7: Cabrillo College visitations by middle and high school students — Fall 1990, Spring 1991, Fall 1991

SMART DAY (Science and Math and Are Really Terrific) is the acronym used for the Cabrillo College visitations by middle and high school students in Spring 1991. Cabrillo instructors provided experiments and hands–on activities for the students in the fields of engineering, physics, astronomy, math and electronics. In addition, campus tours were led by Cabrillo PACE students, who also shared their educational career paths. Transportation was provided for the schools with larger numbers of participants.

High School SMART DAY — April 23, 1991. (See Part III for agenda)

Project–eligible students from all high schools in Santa Cruz County were invited to participate. Students from Aptos, Santa Cruz, Watsonville and San Lorenzo Valley High Schools pre–registered. Actual participation was as follows: Watsonville High School — 22 students, Santa Cruz High School — 15 students, San Lorenzo Valley High School — 1 student. A summary of the student evaluations of SMART DAY is included in Part IV.

Middle School SMART DAY — May 4, 1991 (See Part III for agenda)

Thirty three students from the E.A. Hall Middle School MESA Club were transported to Cabrillo for this Saturday morning activity. A summary of the student evaluations, along with Cabrillo PACE student evaluations, is included in Part IV.

Students and staff reacted very positively to these activity days, as reflected both in the written evaluations and through informal comments. (See Part IV) Because of the success of SMART DAY, we are planning to continue SMART DAY activities during Fall, 1991, where the emphasis will be on biology, chemistry, and computer science.

On November 6, 1991 50 students from Watsonville High attended College Night Orientation at Cabrillo, with a special tour provided by Cabrillo PACE students. The transportation that allowed these students to attend the event was funded by this grant.

Activity 1.8: Tours of Cabrillo College students of California universities — Spring and Fall 1991

Tours to California universities were scheduled for students qualifying for EOPS services. Through meetings and correspondence, PACE students were advised of college open houses with a focus in math, science, or engineering during Spring 1991. Six PACE students were transported to the UC Berkeley Engineering Day on April 19th and one was taken to San Jose State University on April 26th.

Because of the student enthusiasm for these activities, additional tours are planned for Fall 1991. The Program Director met with the Transfer Center Director on May 23rd to facilitate PACE students participating in Transfer Center tours which are being scheduled for Fall 1991.

On October 24, 25, and 26, PACE students were provided with transportation and special tours to California Polytechnic at San Luis Obispo, and San Jose State. Many PACE students attended a special event at UC Berkeley on November 16, and others were part of the UCSC field trip on that date.

Objective 2: **To increase the number of minority students who are prepared and motivated to enter Cabrillo College and major in mathematics, science and engineering, Cabrillo College will develop mentor and family support programs for middle school and high school students.**

Activity 2.1: Speakers program in the middle schools and high schools — Fall 1990 and Spring 1991

E.A. Hall and Watsonville High School MESA Clubs and the junior engineering classes at E.A. Hall have had a number of speakers this year. The speakers have been drawn from Cabrillo College, UCSC, Granite Construction, MESA, Sacramento State University Engineering staff, NASA Ames Research, and IBM.

In addition, the Program Director was a speaker representing Cabrillo College at a College Day program for target high school students presented by San Jose State University.

Activity 2.2: Role model/mentor program — Fall 1990, Spring 1991 (completed, to be continued)

Role Models: The pre–college students have had the opportunity to meet professionals from NASA Ames Research, IBM and Granite Construction Company through the MESA speaker program. These adults have shared their personal career paths and answered student questions, both in large group presentations and in small informal conversations.

The major activity which connected professional role models with students was MESA Shadowing Day, held both on April 10th and May 1st. Direct contact with professionals from several corporations and industries was provided as the students spent a day at these work sites. On April 20th, 13 students visited four Watsonville industries and on May 1st, 3 students visited Granite Construction Company.

Mentors: The pre–college students have met with Cabrillo students in varying capacities, so that the college students really have become both mentors and role–models for them. A Cabrillo student accompanied Watsonville High School students to a mini–MESA Day at Fresno State University in October. Rich Hart, Cabrillo Engineering Instructor, involved Cabrillo students in helping the pre–college students design their MESA Day projects. In addition, the Cabrillo PACE students were tour guides for SMART Days, providing both large group discussions and intimate conversations between participants.

Watsonville High School students work with the E.A. Hall MESA Club, helping the middle school students design their MESA Day projects. Both the

present and future presidents of the Watsonville High MESA Club spoke at the E.A. Hall Awards Night, sharing their enthusiasm for the high school program and suggesting ways that the middle school students can be successful when they join the high school program.

PACE students, in cooperation with the Organization of Latino American students (Olà), attended the EA Hall Orientation meeting October 22, 1991, and continued to work with the middle school students in their weekly meetings, in their trip to the Exploratorium, and in their preparation of Science Fair projects.

Activity 2.3: Family Mathematics Program

Family Math was scheduled for four Tuesday evenings in late April/early May at E.A. Hall School. The identified instructors were both teaching math/engineering at E.A. Hall Middle School. A flyer was sent to all families, resulting in a pre–activity sign–up of 7 participants. As a result, the activity was postponed to Fall, 1991, with promotion during the initial Orientation night. 35 parents enrolled with their students for five Wednesday evening sessions conducted at the school.

Activity 2.4: Day trips to corporate and industry sites — Spring 1991

Pre–college: Watsonville High School students visited the Silver Creek Development project which was being built by Granite Construction in December, 1990. They had an opportunity to speak with planning personnel, to directly observe the site grading activities, and to compare this with aerial planning designs.

E.A. Hall students participated in a field trip to the Long Marine Lab of the University of California , Santa Cruz on December 8, 1990. Next they visited the Stanford Linear Accelerator Center on March 2, 1991, followed by a Stanford University campus tour. Students also had the opportunity to hear a role–model Stanford student speak about her experiences and her vision of what is required for success in a four–year college program.

Students from both schools visited the NASA Ames Research facility on March 23, 1991, following an introduction to the research program at the facility by a

· NASA engineer who spoke at each school on March 15th. Of special note during this field trip was the lunch activity, which was held at the NASA staff cafeteria. Students were permitted to buy their lunch and to informally choose tables in the facility. They were joined by NASA staff who shared their personal educational and work experiences with them. Several of the students reported that this was the highlight of their day. This activity also provided an opportunity for the students from the two schools to become better acquainted, adding to the opportunities for the role–model connections between the two schools.

Both MESA Advisors had their students discuss what they learned at the end of each trip. The students described seeing themselves as being able to work in these industries.

College: Visitations to four–year colleges has become the comparable activity for PACE students, who feel that the visits give them clarity about which schools are best suited to their individual needs.

Objective 3: **To increase the number of minority students who are prepared and motivated to enter, succeed and transfer from Cabrillo College in the areas of mathematics, science and engineering, the college will develop a supplemental instruction program.**

Activity 3.1: College faculty training and professional development — early Fall, 1990 and 1991

A variety of professional development activities has been included this year:

■ Tony Garcia, MESA Central Region Director, provided training for both the Program Directors through a series of ad–hoc meetings, both at Cabrillo and at various campuses with existing MESA programs.

■ Mr. Garcia and the Program Directors then provided the training for the MESA advisors and administrations at E.A. Hall Middle School and Watsonville High School. In addition, they met with staff and administration of Pajaro Middle School and Rolling Hills Middle School, outlining the MESA program options for these schools. Pajaro and Rolling Hills Schools indicated

an interest in adding the MESA project only when on–going funding for the activities can be assured.

■ The Program Director visited the Professional Development Program at UC Berkeley and the ACademic Excellence Program at UC Santa Cruz during October to directly observe supplemental instruction programs at those schools and speak with program staff. Personnel at Glendale Community College and Laney College where tutorial assistance programs are being developed also were directly contacted as we formulated project alternatives and developed the training format.

■ The Program Director also met with all of the math instructors who were to teach Math 4 during Spring 1991 to share ideas being utilized by other programs and to plan for the Spring supplemental instruction project. It was determined that one class, taught by Adele Miller, would be used as the pilot project class. The instructor, Program Director and Math Lab instructional assistant met informally in December and on a weekly basis during the opening weeks of the Spring semester in order to develop the format, select the tutors, determine the content and train the tutors for the supplemental instruction sections.

Throughout Spring semester the Program Director met with the tutors, providing on–going support and training. In addition, the informal observations of the tutors and instructor were used to modify the instructional approach used by the tutors.

■ All Cabrillo staff were invited to an inservice week activity in January and August 1991 which described the project and asked for staff support, especially in identifying and encouraging Cabrillo students to participate in the PACE program. The August session included a presentation to the entire faculty and staff, followed by a small group discussion. Approximately 30 staff participated, with the majority being math and science teachers.

Activity 3.2: Tutor training — Summer 1990

The Program Director met with the student tutors who were hired in the Fall, providing each with orientation. In addition, two training sessions were held

with all tutors, so that they could experience a group process for planning and feedback.

Additional tutor training was provided throughout the Spring 1991 for the tutors working with the Math 4 study groups. First, the tutors visited the ACademic Excellence project at UCSC, followed by a meeting with the Math 4 instructor and Program Director. The Program Director then continued the informal planning and evaluation meetings with the tutors, as modified approaches were developed by the instructor.

Tutor training was continued in Fall 1991.

Activity 3.3: Tutoring for high school mathematics and science students at Cabrillo College Watsonville Center — Fall 1990 and Spring 1991

One–to–one tutorial assistance was offered to Watsonville Center students during the Fall 1990 semester. After assessing the results, it was decided to create a tutorial center staffed for 3 1/2 hours per day for Spring 1991 semester to see if this alternative was more successful. Students were able to receive assistance on a drop–in basis and could come at different times depending on their changing work schedules.

The students utilizing this tutorial support represented both program–qualified students and others, and the administrator of the Watsonville Center decided to fund all of this tutorial support with non–project funds.

Activity 3.4: Tutoring for Cabrillo College mathematics and engineering students — Fall 1990, Spring and Fall 1991

Cabrillo math, science and engineering teachers were contacted both Fall 1990 and Spring 1991 semesters and they were asked to submit names of program–qualified students needing tutorial support. In Fall 1990, each of these students was contacted and tutorial assistance was offered. Several of the students began working with tutors, but scheduling difficulties similar to those at the Watsonville Center (see Activity 3.3) were experienced. In addition, some tutors indicated that the students felt that the need for tutorial support was degrading.

To address these concerns, supplemental study activities, offered under the acronym Pathways to ACademic Excellence (PACE) were developed for Spring 1991. In order to make students aware of the support which was available to them, a letter was mailed to each project qualified student in targeted math, engineering and science classes describing the PACE program. Students were encouraged to schedule an appointment with the Program Director, who described the activities and enrolled those who wished to participate.

■ Study groups: Students were encouraged to form study groups with other students from within the specific math/science/engineering sections in which they were enrolled. Each teacher was notified that the student was interested in study group collaboration so the teacher could assist in identifying others interested in study group participation. Teachers and students were reminded that tutorial assistance was available if they felt that the additional support would be valuable. The Math Lab continued to be the first alternative for students in math classes. Materials used in this outreach are included in Part V.

■ In a Math 154 (Algebra I) class, the Program Director structured study groups for all interested students so that there was no stigma attached to tutorial support. Since the Program Director was directly overseeing the supplemental instruction program, there was no additional cost to the project. About 90% of the students enrolled in the class participated in the study group activities. This included 6 project–qualified students.

■ In one Math 4 (pre–calculus) class, all students were invited to participate in study group activities. This project funded the tutors working only with project–qualified students. About half of the students in the class participated at some time during the semester.

Students utilized this support in a number of ways. Some formed their own study group, either with other members of their class section or with students from other classes. Some worked without additional tutorial assistance while others began alone and added the tutorial support later. One student reported that he worked alone best and he chose to go the Math Lab when he needed help. Another student reported working in a study group in one class in addition to individual tutorial support.

Evaluation: Because of the emphasis on this component in this project, evaluation has been on–going throughout the year. In the fall semester, an informal assessment helped us determine that a new approach was needed. During spring semester, we asked each student in the pilot classes to complete two written evaluations. The first was given half way through the semester and we used the suggestions to modify the study group structures. The second was given as part of the culminating activities in the classes and a complete summary is included in Section IV.

In addition, the instructor in Math 4 summarized her thoughts and suggestions (see Section IV), recommending that the groups be continued and included in all sections of Math 4. The tutor who worked with most of the study groups also recommended involving all sections. (see Section IV)

■ All PACE students were invited to a meeting on May 22nd at 7:15 a.m., where the Program Director, Program Assistant and Engineering Instructor met with the students, discussing all aspects of the PACE program. The students indicated that the study groups had been very beneficial and they suggested that both students and staff needed additional encouragement to establish the groups. They felt that it would help to include a schedule of study group hours in the Schedule of Classes as well as the registration table. They also felt that instructors who give assignments requiring group work support the study group concept, since the students were directly rewarded for their efforts.

Other students felt that the Math Lab was equally of value, since it was possible to have one–to–one tutorial support. In addition, the one–to–one tutorial support in science classes was identified as helpful. The students are eager to help other study groups get established for the Fall 1991 semester and they volunteered to contact potential PACE students during the summer and in the opening weeks of the Fall semester so that students would know of the services which are available. They also recruited in the cafeteria, since many potential students congregate in that area.

In Fall 1991, a flyer was prepared to describe PACE services. This flyer was distributed at registration, through opening class presentations in the division, and by current PACE members. New members attended an orientation meeting,

and came to the PACE office to sign up for tutors and study groups. 22 study groups were formed during the semester. Additional newsletters on procedures to form a study group and receive tutorial assistance were given to members, and mailed to 700 qualified students enrolled in division classes.

As part of the PACE program, we agreed to follow up of the progress and status of the arranged study groups for the fall semester. In the middle of the semester, we called a number of our PACE members to discover their study group status and class standing. The majority of the study groups were going well and seemed to have made a difference in the students academic status and overall attitude towards school and their science classes. Though there were a few members with individual academic problems, dropping out of classes that were too advanced and problems with tutors, the majority were satisfied with their tutoring experience and looked forward to continuing study groups in their classes next semester. The students who did not have a good experience with their study groups for this semester agreed that this was a good method and that they would continue to use this type of studying practice either through our organization or develop a study group of their own.

Activity 3.5 Inservice training for middle and high school mathematics and science teachers — Summer 1990 and 1991

All math and science teachers were offered the opportunity to participate in the MESA summer meetings and training programs for teachers. Three staff from E .A. Hall Middle School accompanied Tony Garcia, MESA Central Region Director, and Rich Hart, Cabrillo Engineering Instructor, to the training sessions. No Watsonville High School personnel were able to participate and the Program Director had not been appointed at the time of the 1990 trainings. The second Program Director did attend the Advisors training in August of 1991.

In addition, one of the mathematics instructors benefited from orientation to the Family Math program by two other trained

Objective 4: **To increase the number of minority students who are prepared and motivated to enter Cabrillo College, the college will integrate MESA activities into the program.**

Activity 4.1: MESA hands–on training — summer, 1990 (completed, to be continued)

As described in Activity 3.5 above, two teachers and one counselor from E.A. Hall accompanied Rich Hart, Cabrillo Engineering Instructor and Tony Garcia, MESA Central Region Director, to the MESA training provided during the summer. On–going training has been provided for these staff along with the Watsonville High School staff through intermittent on–site meetings with Tony Garcia and the Program Director.

It is hoped that both MESA advisors and other math/science or counseling staff will participate during August, 1991.

Activity 4.2: Cabrillo College and middle and high school mathematics, science and engineering faculty meetings — Fall 1990, Spring and Fall 1991

The activities of the total project were shared with Cabrillo College math, science and engineering faculty through a Flex Day Panel Discussion involving the Program Director, Rich Hart, Cabrillo engineering instructor, Don Brown, E.A. Hall science teacher and MESA Advisor, and Elio del Cañal, Watsonville High School math teacher and MESA Advisor. Cabrillo staff were encouraged to share their experiences with the project from the Fall 1990 semester and to consider ways that the project could support the students in their classes for the Spring semester. The pilot supplemental instruction model was positively received and several instructors indicated an interest in receiving additional information on the results of the pilot.

The Program Director met weekly with the MESA Advisors at each of the feeder schools to coordinate activities and to plan the program. The Program Director also met periodically with pre–college administrators. In the Fall 1991, meetings were reduced to phone contact, due to budget and time constraints.

Activity 4.3: Pajaro Valley Unified School District mentor program — Spring 1992

At the time the project was developed, the Assistant Superintendent of the Pajaro Valley Unified School District planned to implement math in their district mentor program for the following school year. The Assistant Superintendent

left the district before the project received approval. The project was abandoned by the district.

Activity 4.4: MESA Competition— Fall, 1990, and Spring 1991

The MESA Day competition is the culmination of much of the MESA Club activity, with weekly planning meetings, Saturday Academies (where projects are built), and club–level pre–trials. The students learn team–work in many of the activities, since few of the events are open to individual entry.

Three Watsonville High School students joined one Cabrillo student and the Program Director for a mini–MESA Day competition at California State University at Fresno during October. This gave the students the opportunity to observe the activities of a MESA Day prior to the main competition held April 13, 1991.

Watsonville High MESA students prepared for participation in MESA Day through Saturday Academies. A Cabrillo College engineering instructor and Cabrillo students assisted the high school students as they worked on building projects like a toothpick tower and balsa bridge. The success of this work was demonstrated when students received awards in four of the MESA Day competitions.

Both schools participated in MESA Day, represented by 13 students from Watsonville High and 25 students from E.A. Hall. Again, the students rode together on a bus, providing additional support for role–modeling between the grade levels.

The Watsonville High students were very successful in the competitions, placing first in the highest level math test, as well as receiving additional awards in the balsa bridge and toothpick tower competitions. The E.A. Hall students had not attended a competition previously and came home with a clearer understanding of how to be more successful in the competition next year. They are already discussing their plans and looking forward to the next MESA Day. In addition the Watsonville High School Awards Banquet was held on May 17 in the high school cafeteria. Parents of all MESA students were invited and about 75 people attended the event. The MESA Club gave a plaque to Vince

Carrillo, representative of Granite Construction Company, in acknowledgement and appreciation of the Company's contributions to the MESA Club activities. All seniors were recognized for their contributions, in addition to those students who had won awards at MESA Day in April. Incentive awards and scholarships, donated by Granite Construction and the Cabrillo Foundation, were given to deserving students. Cabrillo project staff and Tony Garcia, MESA Regional Director, spoke at the banquet.

The E.A. Hall Middle School Awards Night was held on May 30th with more than 200 parents and students in attendance. Each student received a certificate recognizing participation in the MESA program and those who participated in MESA Day received an additional certificate. As the certificates were awarded, each student shared a dream for the future. Without exception, the students indicated that they were planning on a college education, with the majority interested in engineering, science, law or teaching. Eugene Garcia, Dean of Social Sciences at U. C. Santa Cruz, spoke.

Objective 5: **To increase the number of minority students who receive financial assistance to promote their entry into, success at, and transfer from Cabrillo College, the college will develop a scholarship program.**

Activity 5.1: Establish a scholarship program through the Cabrillo College Foundation — Fall 1990

The Program Director and Rich Hart, Cabrillo Engineering Instructor, met with Cliff Nichols, Acting President, to discuss a scholarship program proposal which was submitted to the Cabrillo College Foundation. The Foundation funded the proposal, which requested seed money to establish 4 scholarships – – 2 for incoming students and 2 for continuing students.

The Program Director and Engineering Instructor met in Fall 1991 to plan fund–raising activities to establish a permanent endowment for the scholarship program. Letters were sent to several prospects, including the Lurie Foundation, who responded with $1,000 in funding. Other funding may still be forthcoming.

Activity 5.2: Disseminate information on scholarships — Fall 1990 and Fall 1991

Information about engineering scholarships was posted during Fall 1990 semester throughout the campus and was also available through the Scholarship Office.

The MESA scholarships were funded by the Cabrillo Foundation just before time for scholarship awards. As a result, the Program Director and Engineering Instructor met and identified recipients for the awards this year, based on recommendations from instructors and student grade records. Dissemination of information about these and other scholarships was continued in Fall, 1991.

Activity 5.3: Award scholarships to entering and transferring project students — Spring 1991

Four scholarships, two for entering students and two for transferring students, were awarded at the Cabrillo Scholarship Program on May 23, 1991. The scholarships will be continued for the 1991—92 school year by the Cabrillo Foundation, with fund–raising activities providing for a permanent endowment.

Objective 6: **To establish and maintain a program management component to implement the activities, evaluate the effectiveness of the activities and to disseminate information on the program.**

Activity 6.1: Reassign a Cabrillo College faculty member 50 percent to direct this program — Fall 1990 and Spring 1991 (completed)

A part–time math faculty member was hired for 20 hours a week as the year–long Program Director when it was determined that a reassignment of an existing Cabrillo College faculty member was not feasible. The faculty member continued as an advisor to the project during Fall, 1991. A new Program Director, also a part–time Cabrillo instructor, was hired to oversee the project 12 hours a week during Fall 1991.

Activity 6.2: Administer surveys to students and faculty and analyze results — Spring, Summer, 1991

A number of surveys, both formal and informal, have been administered to students and staff during the school year and the results of those surveys and evaluations are included in Part IV. To date, specific feedback has been obtained for the following:

Middle school students	SMART Day
High school students	SMART Day
Cabrillo PACE students	SMART Day
Cabrillo faculty	SMART Day
Cabrillo students	Supplemental instruction groups
Cabrillo faculty	Supplemental instruction groups
Cabrillo tutors	Supplemental instruction groups
Cabrillo PACE students	PACE activities

In addition, a comparison was made of data during a Baseline period (Spring 1990, before the grant activities) with current year figures for enrollment and completion of the target PACE population in math, science and engineering courses at Cabrillo. Although the first semester may be premature to see any impact solely attributable to this project, the data did show some progress toward our goals:

Of 6,229 students enrolled in Math, Science and Engineering courses at Cabrillo College in Spring of 1990, 926 or 14.9 % were Spanish/African/Filipino/or Native American. Of this minority group, 57.88 % completed the course in Spring 1990, 7% received an A grade, and 37% (344) received a transferable grade. This compares to the entire population, in which 63.71 % completed the course, 15% received an A grade, and 49% (3044) received a transferable grade.

In Spring 1991, 6790 students enrolled in Math, Science and Engineering courses, and 1108 or 16% were target minority members. Of this group 59.2 % completed the course, and 6.4 % received an A grade. 402 or 36% received a transferable grade. This compares to all students enrolled in these courses, in which 65.47 % completed the course, 16% received an A grade, and 2962 or 43% received a transferable grade.

Spr. sem: Year	1990		1991	
Total # in MSE courses	6,229		6790	
# minority	926 (14.9%)		1108 (16%)	
	minority	*all students*	*minority*	*all students*
course completion	57.8%	63.71%	59.2%	65.47%
grade "A"	7%	15%	6.4%	16%
transferable grade	37%	49%	36%	43%

Activity 6.3: Develop record keeping system on students — Fall, 1990 and Fall 1991

All middle and high school students who are participating in the program are enrolled as MESA students, meeting the state–wide guidelines and utilizing the MESA record keeping system.

Records of the Cabrillo College participants are kept on a data base established at Cabrillo. Participants are referred by staff and are self–referred after an out–reach invitation from the Program Director.

Activity 6.4: Write report which can be distributed to other California Community Colleges

This summary report describes the activities and results of the project.

Activity 6.5: Submit to California League for Community Colleges a request to present the project

When requests for presenters for the Spring 1992 meeting is received, Cabrillo will submit a proposal to present this project. We will also consider requesting the opportunity to make a presentation at the Fall 1991 meeting of the California Mathematics Council for Community Colleges.

Section IV: Observations

Following the Activities of the grant, the MESA Center developed some observations that lead to recommendation for other schools considering such a program. Some elements are included in Section II, How to Start a MESA Center at a Community College. In addition, some case histories give a more subjective feel for the students this program serves, and the difference it can make in their lives.

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Observations

It is easy to say, if we were starting over, we would do some things differently, but that is the nature of a pilot program. In this section, we will detail some of the barriers we encountered, and recommendations for others implementing a similar project.

1. Because of the "learning curve" on this type of project, we recommend starting with funding that is longer than one year. This allows everyone involved to develop a track record and systems, so that some momentum and a number of schools can be established in the program.

2. At the college level, allow adequate planning time to make this adjustment to curriculum. This allows students to schedule this time so that study time does not fall by the wayside.

3. Rather than limiting funding to the minority group, fund tutors by demonstrated need, with a special outreach to minority students by teachers.

4. Develop a commitment among faculty to the role of the community college in helping students develop college level skills, instead of the "sink–or–swim" approach to students at risk of dropping out.

5. Make active efforts to inform entering minority students about the logistics of enrolling in impacted required and transferable courses.

6. Prepare minority students for the increased hours of study required in college (as compared to high school) by scheduling two hours in a study group for every one hour in the classroom as part of their enrollment process.

7. In addition to tutorial help, provide funding for access to texts and calculators: in many cases, this is more of a barrier to entering the course than the tuition. Access may take the form of texts on reserve in the library.

8. In pre-college programs, the center needs to provide support to faculty advisors at each of the pre-college schools. This includes weekly meetings with the advisor to serve as a sounding board and

reinforcement, as well as funds for field trips and speakers. Budget to provide stipends to faculty advisors, who spend long hours on MESA activities. Where needed, budget for translators to work with the advisors.

9. The school advisor is a *critical* component of this program. Their rapport with the students, and their willingness to take on the many details of running this program can make the difference between success and failure. Therefore, the selection process is key.

10. Another key to success is engaging older students to work with younger students at each level. In the Cabrillo program, the volunteer efforts of the PACE and Olà students in working with the middle school and high school students has been particularly inspiring.

11. Allow time for networking to bring full benefits to your program. There are many compatible programs working toward similar aims on your campus and in your community, and this networking process is really the means by which the MESA program comes to life. The connections and services within Cabrillo between EOPS, tutorial, matriculation and the transfer center were all enhanced by this process. In addition, connections with UCSC's parallel program, the County Office of Education, and community businesses were also improved.

12. Use phone as well as written communication to enhance participation in activities.

Comparisons of MESA Statewide model and the Cabrillo College model

The MESA Statewide office has developed a most successful model, and in almost all cases, the Cabrillo College Center has followed their guidelines. There are, however, two areas where they differ slightly from MESA Statewide.

The first area of difference has to do with the use of the name MEP (MESA or Minority Engineering Program) for the university level MESA services. Cabrillo's grant from the Chancellor's office was based on the assumption that the Center will help recruit minorities for all areas of the math–based sciences, including engineering. Therefore, the name PACE was chosen for community college level services, as a parallel to the other University of California program for minorities in math and science--ACademic Excellence (ACE.) This is not intended to exclude MESA from the college level; on the contrary, Cabrillo has maintained good relations with MEP offices on neighboring campuses that have hosted PACE students and helped encourage transfers. Cabrillo hopes to become an official MESA center for community college students, as it is already a center for pre–college students.

The second area of difference has to do with the definition of the target population. MESA Statewide's definition includes African–Americans, Native Americans, Puerto Ricans, and Mexican–Americans. Again, our grant from the Chancellor's office focused on a slightly wider definition which includes Filipino and all Hispanic–Latino populations. Cabrillo College feels it can serve the MESA group while also providing service to the broader group.

Pre–college and/or community college programs?

It would be easy for any agency (community college, county office of education, etc.) to use Section II A and B to set up a pre–college program. It would also be possible for a community college to only use Section II A and C, and set up a college level program only. Based on the Cabrillo experience, there are many benefits to setting up concurrent programs. Involving pre–college students with college mentors is inspiring to both sides of the transaction. Involving pre–college students with visits to and from their own community college makes the prospect of college less frightening and more approachable. It also increases the probability that they will feel comfortable attending the local school when they are ready to take that step. As described in Section I, it is very important to intervene at an early age to set new patterns. For all these reasons, Cabrillo College recommends setting up concurrent pre–college and community college programs.

The following summary was provided in the second interim report on the grant, and may be useful in understanding some of the mechanics and benefits of this type of program.

PERSONAL HISTORY: It is difficult to describe a "typical" student in this project but we have chosen at least one from each level since it is helpful to have a sense of the students who are involved:

E.A. Hall Middle School: "José" is an 8th grade boy, full of energy and ready to impress his friends. He wanted MESA Club to be fun and looked forward to the field trips. He tried to build a box which would successfully protect an uncooked egg in the "egg drop" contest at MESA Day but his team was unsuccessful due to their inexperience. He spoke at Awards Night, as did all of the MESA Club members, in response to the question "What is my dream?" He said he wants to be a space engineer. He certainly was in good company, since nearly all of the 35 boys and girls who spoke that evening identified some professional career goal. "José" is looking forward to continuing with MESA at Watsonville High School.

Watsonville High School: "Sara" is a senior graduating near the top of her class, as are most of the senior MESA students. Like many others, she has been accepted to a four–year school, but is struggling with her decision about where to attend. Her father is disabled and her mother supports the family. They reside in a trailer provided by FEMA since the earthquake. MESA gives "Sara" social as well as emotional support. She has many friends in the group who also deal with the cultural tug of war —— whether to help support the family financially or get an education. The community college can provide this truly talented student with the option of continuing her education while remaining close to her family.

Cabrillo College: These last two students have shared their own life experiences with the students from E.A. Hall Middle School so we have included their real names:

Rick is a man in his 30's, having returned to school to study engineering after working for more than 10 years as a mechanic. He is clear about his goals, knows what he wants, and speaks up for his needs as well as those of his classmates. He formed study groups within all of his math and science classes, getting additional tutorial assistance for the group when it was needed. He was a tour guide for SMART DAY, encouraging the middle school students to stay in school and do their homework. He volunteered to call new Cabrillo students this summer so that he could tell them about what PACE can do for them and how it helped him, even though he will be attending San Jose State University to study engineering in the fall.

Belén is a young woman in her 20's who told the middle school students that she dropped out of school in junior high and again in high school to work in the strawberry fields, but she still wants to be a math teacher. She worked with her study group in pre–calculus, getting additional individual tutoring for herself, since she had difficulty keeping up with the pace of the group. She proudly told the others at the last PACE meeting that she was finally earning an "A" in math and that without the help of PACE, she could not have been successful.

While some of the Cabrillo students are younger than the two identified above, all are working and attending school, a challenge in itself. They are anxious to bring other students into the PACE program in the fall since they feel that it has helped them so much this year.

This project has been a challenge because it involves a broad variety of activities all of which require coordination and communication. Some of the communications and forms developed are included in Section V since they provide the flavor of the PACE aspect of the project as it has been communicated to date. The program has academic excellence as its focus and every effort has been made to be clear that it is not a remedial program.

■ Cabrillo continues to benefit from direct contact with its feeder schools. This joint Cabrillo/Pajaro Valley Unified School District project has strengthened the fledgling MESA Project which previously depended heavily on the volunteer efforts of the Cabrillo engineering instructor.

■ The pre–college program reflects a growing calendar of activities which require support from both school district and Cabrillo staff. Involvement from both these sources will be crucial to continuing this extensive level of student activities.

■ The junior engineering class at the middle school is especially exciting, since it creates a vision of a realistic goal for students who now can be nurtured through a 4–level pipeline of middle school, high school, community college and four–year college. As indicated above, MESA is interested in promoting this model in other programs throughout the state.

■ The college aspects of the project have been developed this year. We have identified the specific services to be offered, developed the network of staff through whom to reach students, created the communication structures for seeking students, and evaluated and modified the approaches. The openness to new ideas from all levels of staff has been especially refreshing and final evaluations will determine which aspects survive and which receive additional modifications.

■ The supplemental instruction component has developed continuously as the instructors, sections leaders and math lab instructional assistant met and revised the approach. Based on feedback from students, we provided additional training for section leaders and modified the structure of the sections themselves.

■ Providing services to some students and not to others has proved to be an issue with the math faculty. Some are concerned about being insensitive to underrepresented students; they fear that students will feel labeled when they receive communications identifying them as a minority population. Other staff feel that tutorial assistance needs to be provided for all students regardless of ethnicity. Developing support and encouragement for students while being sensitive to these issues is a major challenge.

■ The issue of continuity for the program in succeeding years is a critical one. One of the middle schools refused to participate in the project this year because of the concern that a one–year program raises expectations which cannot be met. In addition, changes in personnel require extensive inservice. If the activities developed are to survive, permanent funding will need to be established.

■ The students themselves are the most consistent source of hope and encouragement. They are enthusiastic and open about their educational plans and have indicated a willingness to be involved with a variety of activities in order to strengthen their academic competence. They definitely will make a positive impact on their spheres of influence when they have completed their educations.

The project has the long–range potential for realizing its mission. It is worth restating that mission as it was rearticulated by the MESA Board of Directors at its meeting on January 25, 1991:

> *To develop academic and leadership skills, raise educational expectations, and instill confidence in minority students (African American, American Indian, Mexican American and other Latino American) historically underrepresented in engineering, physical science or other math–based fields, in order to increase the number who graduate from a four–year university.*

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UNDERREPRESENTED STUDENTS SPECIAL PROJECT FUND

PROPOSAL BUDGET SUMMARY

WHEN ENTERING DOLLAR AMOUNTS, ROUND OFF TO NEAREST DOLLAR. *DO NOT TYPE CENTS.*

OBJECTS OF EXPENDITURE	CLASSIFICATION	LINE	LOCAL FUNDING	UNDER-REPRESENTED STUDENTS SPECIAL PROJECT FUND	OTHER	TOTAL
1100	Teachers' Salaries	1	15,779			15,779
1200	Supervisors' Salaries	2	2,738	19,848		22,586
1200	Counselors' Salaries	3	3,278			3,278
2100	Clerical Salaries	4	2,199			2,199
2200	Instructional Aides' Salaries	5				
2300	Other Classified Salaries	6		22,815		22,815
3000	Employee Benefits	7	7,763	////////////////////////		7,763
4100	Textbooks	8				
4200	Other Books	9				
4XXX	Instructional Supplies	10		750		750
4XXX	Media Supplies	11				
4XXX	Other Supplies	12		1,487		1,487
5XXX	Contracts (Services)	13	300	6,000		6,300
5XXX	Conference, Travel	14		500		500
5XXX	Contracts, Rent	15		3,600		3,600
5XXX	Utilities, Housekeeping	16				
6400	Equipment Lease Purchase	17		////////////////////////		
Total Direct Costs		18	32,057	55,000		87,057
Total Indirect Support Charges %		19		////////////////////////		
Total Program Costs		20	32,057	55,000		87,057

* Provide breakdown of all planned expenditures by categories on next page.

Underrepresented Students Special Project 1992	Local Funding	Under-Represented Students Special Project Fund
Certificated:		
PACE/MESA Coordinator Susan Claire - $827 X 12 units		$9,924
Math/Science/Engineering Division Chair Wanda Garner - 2% of $60,147	$1,203	
Dean of Instruction Claire Biancalana - 2% of $76,749	$1,535	
PACE/MESA Counselor to provide outreach with feeder schools Francisco Ponce - $827 X 12 units		$9,924
Math instructor reassigned for tutor training and cordination Jazim Rubaii - 8.333% of $40,872	$3,406	
Engineering instructor reassigned to work with high schools and middle schools Rich Hart - 20% of $61,865	$12,373	
Transfer Center Director to work with transfer students Donna Mekis - 5% of $42,110	$2,106	
Articulation Officer to work with college articulation Lynn Harlan - 2% of $58,590	$1,172	
Classified:		
Part Time Hourly - Office Assistant I 19 hours/32 weeks @ $8.05/hour		$4,895
Administrative Secretary II Katie Franotovich - 2% of $29,095	$582	
Division Secretary Sharon Richardson - 2% of $24,486	$490	
Part Time Hourly - Tutors 8 Tutors, 10 hours/32 weeks @ $7/hour		$17,920
Articulation Program Assistant to work with high school faculty Catherine LaChance - 5% of $22,531	$1,127	

Underrepresented Students Special Project 1992	Local Funding	Under-Represented Students Special Project Fund
Academic Benefits:		
Susan Claire @ 9.79%	$972	
Wanda Garner @ 2%	$232	
Claire Biancalana @ 2%	$272	
Jazim Rubaii @ 2%	$187	
Rich Hart @ 20%	$2,365	
Donna Mekis @ 5%	$474	
Lynn Harlan @ 2%	$229	
Classified Benefits:		
Tutors @ 9.79%	$1,754	
Katie Franotovich @ 2%	$196	
Sharon Richardson @ 2%	$172	
Office Assistant I @ 9.79%	$479	
Catherine LaChance @ 5%	$431	
Instructional Supplies		$750
Non-instructional Supplies		$1,487
Professional Services:		
Stipends for elementary, middle, & high school faculty for Saturday activities ($20/hr @ 4 hrs for 12 days for 5 faculty)		$4,800
Family math program		$600
Counselors breakfast	$300	$600
Mileage for director, faculty, & counselors		$500
Rental Buses:		
Bus & driver for tours to Cabrillo, local universities, & industry - 12 trips @ $300		$3,600
TOTAL	$32,057	$55,000

CABRILLO COMMUNITY COLLEGE DISTRICT

INDEPENDENT CONTRACTOR SERVICES DESCRIPTION

JOB DESCRIPTION: The director is responsible for the supervision of the externally funded program entitled Promoting Minority Student Transfer in Math, Science and Engineering Through Academic Outreach and Support. The Program Director will be responsible for coordination of the Project Advisory Committee; coordination with the project staff; management of the budget; coordination and monitoring of all project activities; evaluation of the project; coordination of documentation and dissemination of information on the project; and planning for all institutionalization of the project. The Program Director shall serve on the Program Advisory Committee which will serve to facilitate articulation and development and evaluation of the project components. The Program Director will conduct formative and summative evaluations of student gains in mathematics, science and engineering performance and teachers' pedagogical improvements.

TYPICAL DUTIES AND RESPONSIBILITIES: 1) Coordinates the program advisory committee and organizes its meetings; 2) arranges meetings and events such as the counselors' breakfast and training, middle and high school visitations; 3) arranges a speakers' program for the middle and high schools; 4) implements the Family Mathematics Program; 5) coordinates day trips to corporate and industry sites; 6) implements the Tutoring Project; 7) assists in the development and implementation of a scholarship program with the Cabrillo College Foundation; 8) coordinates the evaluation of the program; 9) maintains records on the program; 10) writes reports about the program; 11) publicizes the program.

Pathways to ACademic Excellence (PACE)

Room 704, Math-Science-Engineering Division, Cabrillo College
6500 Soquel Drive, Aptos, CA 95003 (408) 479-5734
Susan Claire, Project Director

Job Opening

Office Assistant 1 or 2
PACE/MESA program (underrepresented minorities grant)

10 to 19 hours a week

Primary responsibilities:

Data entry: accurate keyboard entry of large data base; maintain & update current version
Mailings: merging data base with custom letters, stuffing, labeling, postage, etc.
Phone work: Using charm and courtesy, arrange for board members meeting times, student tutors, bus requests, reserve campus meeting space, etc.
In-person coordination: Student/PACE members, faculty, tutors

Cabrillo paperwork: order, fill out, and maintain records for expense reimbursement, budget expenditures, etc.

MESA paperwork: data entry from pre-college students to California headquarters of MESA
Newsletter production: Using the MacIntosh assist in completing camera ready art, coordinating printing and mailing
Correspondance, copies, other support as needed by the project director.

Desirable skills: Able to work with a Macintosh: Word, Pagemaker, Filemaker, Works programs; accurate at spelling

Able to establish and maintain files

Warm, friendly personality on phone and in person

Optional: Speak spanish, and/or some math/science background

WHAT IS MESA ?

athematics, Eng-
ng and Science
evement (MESA) is
of the country's most
cessful programs to
ist historically
derrepresented ethnic
udents (African Ameri-
an, American Indian,
Mexican American and
other historically
underrepresented Latino
Americans) earn math-
based degrees from four-
year colleges.

MESA is funded by
the State of California, corpo
rations, and private founda
tions. It serves over 14,000
students throughout Calif
The MESA Secondary Pr
(MSP) provides support
students from fourth gr
through high school. I
Minority Engineering
(MEP) offers acader

¿QUE ES MESA?

Logros en
Matemáticas,
Ingeniería y Ciencia
(MESA) es uno de los
programas más
exitosos de este país
que ayuda a los
estudiantes que
históricamente han
sido inadecuadamente
representados
(Africo-Americanos,
Indio-Americanos,
Mexico-Americanos y
otros Latinos) a
obtener títulos
universitarios
relacionad...

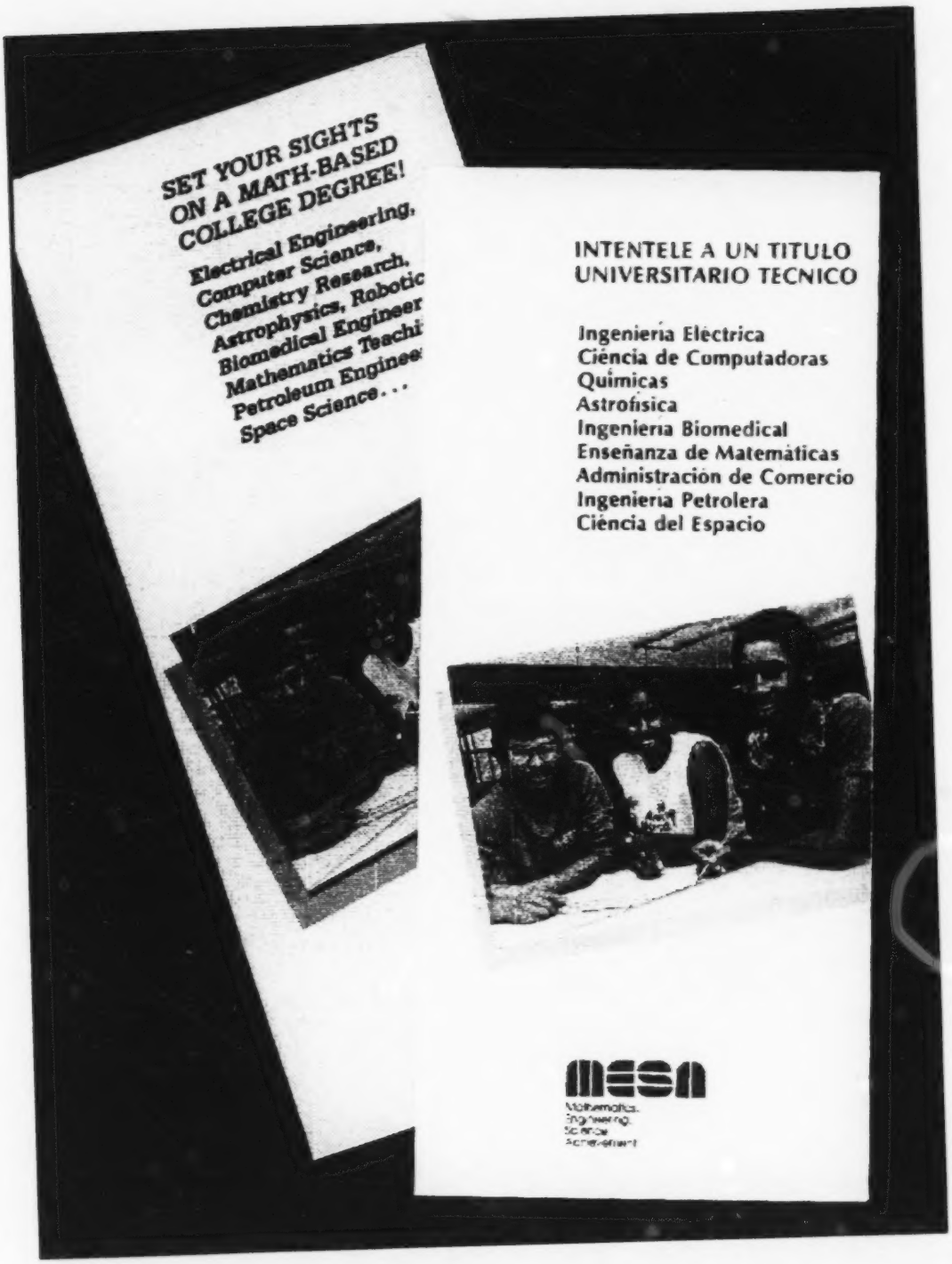
MESA es financiada por
el Estado de California y por las
donaciones de diversas
corporaciones. Sirve a mas de
14,000 estudiantes por todo
California. El Programa
Secundario de MESA (MSP),
provee apoyo para los
estudiantes desde el cuarto grado
hasta la secundaria (high school).
El Programa de Ingeniería de
MESA (MEP) ofrece a
estudiantes universitarios de
ingeniería asistencia académica.
La meta de MESA es el de
establecer un programa que
continuamente provea servicios
a estudiantes desde sus años
elementales hasta sus años
universitarios.

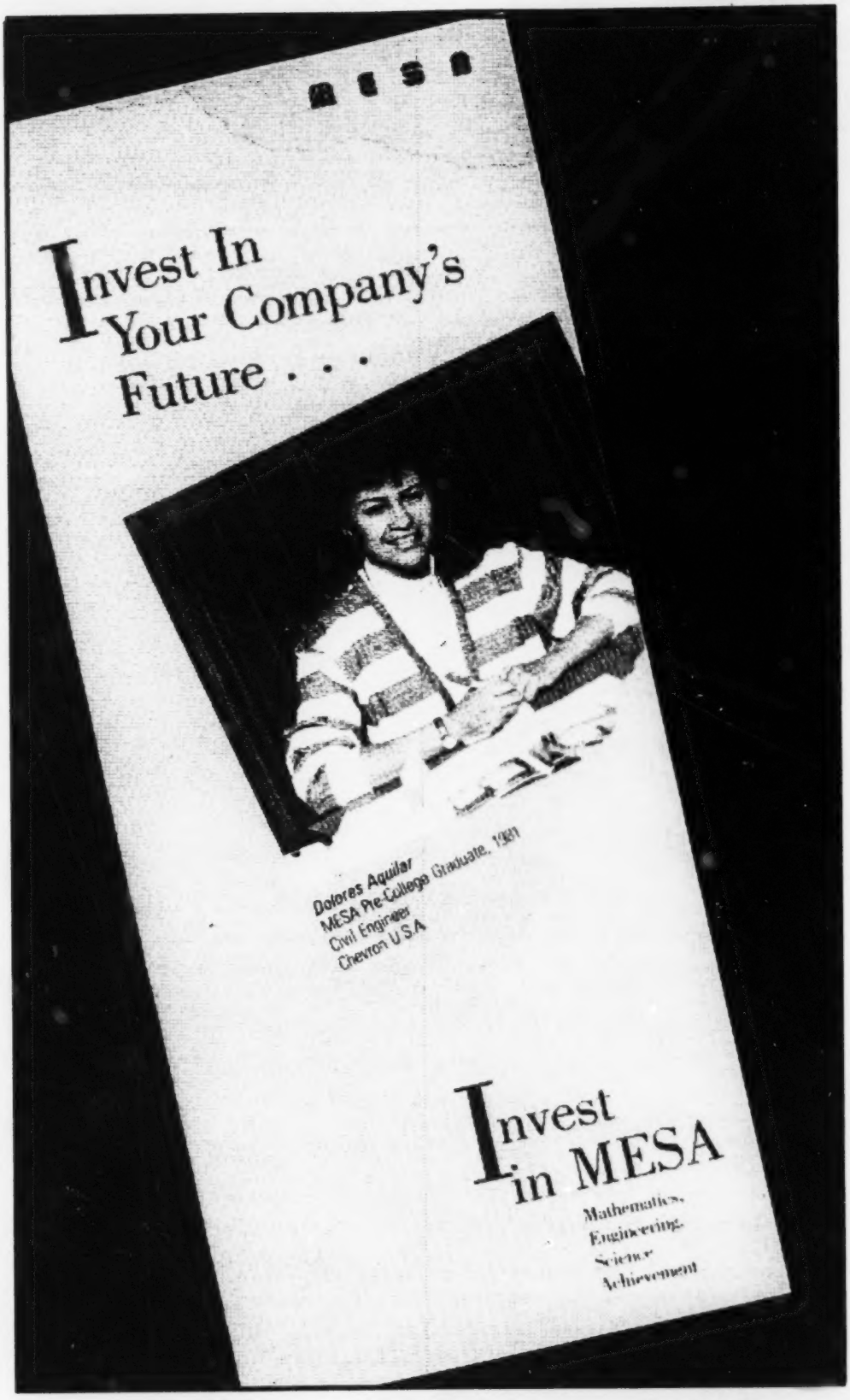
Por mas de 20 años, M...

tornar profesio
rramas de ciencia
y matemáticas. M
obtenido tanto ex
esta se ha constitu
modelo para otros
similares en 14 esta
fuera de California.

Varios rasgos distint
contribuyen al éxito
El programa tiene bas
académicas: MESA tra
estudiantes que demue
aptitud y los apoya par
sobresalgan; MESA es u
organización asistencial
compuesta de escuelas p
universidades, y compañ
industriales. Muchas

How to start a MESA Center at a Community College, page 55


SET YOUR SIGHTS
ON A MATH-BASED
COLLEGE DEGREE!
Electrical Engineering,
Computer Science,
Chemistry Research,
Astrophysics, Robotic
Biomedical Engineer
Mathematics Teachi
Petroleum Enginee
Space Science...
INTENTELE A UN TITULO
UNIVERSITARIO TECNICO
Ingeniería Eléctrica
Ciéncia de Computadoras
Químicas
Astrofísica
Ingeniería Biomedical
Enseñanza de Matemáticas
Administración de Comercio
Ingeniería Petrolera
Ciéncia del Espacio
MESA



How to start a MESA Center at a Community College, page 57

Appendix C4

MESA Mathematics, Engineering, Science Achievement

ENROLLMENT FORM (EF)

[ ] New Student
[ ] Returning Student Update

PLEASE COMPLETE ALL ITEMS AND PRINT CLEARLY

Social Security Number: _____-_____-_____ School: _____

Last Name: _____ First Name: _____ M.I.: _____

Permanent Address: _____

City: _____ State: _____ Zip: _____

Birthdate: ___/___/___ Grade: _____ Gender: ___ 1.Male, 2.Female Home Phone: (___)____-_____

Parent/Guardian Name: _____ Work Phone: (___)____-_____

Parent/Guardian Name: _____ Work Phone: (___)____-_____

Ethnicity (please check one): [ ] 1. Native American, [ ] 2. African American, [ ] 3. Mexican American/Chicano
[ ] 4. Puerto Rican, [ ] 5. Other Latino American

Is a language other than English spoken regularly in your home? [ ] 1.No, [ ] 2.Yes, specify _____

Summer Programs Participated
(please check all that apply):
[ ] 1. MESA Summer Program
[ ] 2. Other Summer School Program
[ ] 3. Special Summer Activity
[ ] 4. Summer Job
[ ] 5. Other Program, please specify _____

Other Programs Participated
(please check all that apply):
[ ] 1. Head Start
[ ] 2. UC Early Outreach
[ ] 3. CSU Early Outreach
[ ] 4. Upward Bound

What math courses are you currently enrolled in (please specify)?

_____[ ][ ][ ]

_____[ ][ ][ ]

What science courses are you currently enrolled in (please specify)?

_____[ ][ ][ ]

_____[ ][ ][ ]

What English course are you currently enrolled in (please specify)?

_____[ ][ ][ ]

What computer course are you currently enrolled in (please specify)?

_____[ ][ ][ ]

Primary Career Interest (please check one):
[ ] 1. Engineering
[ ] 2. Computer Science
[ ] 3. Physical Science
[ ] 4. Mathematics
[ ] 5. Business
[ ] 6. Other Math-Based Careers
[ ] 7. Health Profession
[ ] 8. Non-Math Based Career
[ ] 9. Don't Know

Highest level of education achieved by each of your parents or guardians? (please write the corresponding number into the boxes):
[ ] Father [ ] Mother
1. No school/elementary school
2. Eighth grade or less
3. Some high school
4. High school graduate
5. Some college or university
6. Community college degree
7. 4-year college degree
8. Beyond 4-year college degree
9. M.S./M.A./M.B.A./Ph.D degree
0. Don't know

What type of work have your parents or guardians typically done over the past years or prior to retiring?
(please write the corresponding number into the boxes):
[ ] Father [ ] Mother
1. Engineer
2. Computer Scientist
3. Other Professional
4. Manager/Supervisor
5. Sales/Clerical
6. Skilled technician, trade
7. Factory worker
8. Farm worker
9. General worker
10. Never employed
11. Don't know

I give my permission for MESA to obtain information about my academic performance from high school, colleges, and testing agencies, to give my name and address to college and employer representatives, and to use my name and photograph in MESA press releases.

Student's Signature: _____ Date: _____

Robert A. Lurie, President
Louis R. Lurie Foundation
555 California Street, Suite 5100
San Francisco, CA 94104

Dear Bob:

Thanks for returning my call this morning and listening to me rattle on about MESA -- Mathematics, Engineering, Science Achievement. I enclose a number of items which partially document the program, including MESA Highlights which refers to your foundation on the last page. Perhaps this will assist you in sleuthing out how this all came about.

California, as the sixth largest nation-state in the world, has an economy which is heavily based on technology, including our agriculture. The current and continued success of this technical economy is largely dependent on the talents and skills of a highly trained and educated work force. Education and industry have realized for some time that to provide this pool of talent to keep California viable into the 21st century will require many efforts. MESA is one of those industry-education joint-ventures designed to accomplish the task.

In a nutshell, MESA's goal is to increase the number of historically underrepresented kids who satisfactorily complete high school and continue on to major in math and science based fields in college, with ultimate graduation and employment in these critical areas. The enclosed materials testify to the success of the program.

MESA Statewide provides general support to the over 200 programs in California, but the local program operating budgets are funded by school districts and gifts from business and industry. Our program involves Watsonville High School which has been adopted by Granite Construction Company and E.A.Hall Middle School which is supported by Tandem Computer. These schools, and others soon to be added to the program, are connected to MESA Statewide via Cabrillo College. We are pleased to be the first (and only, so far) community college to be directly involved in the MESA effort. Otherwise, all MESA activities are coordinated by Centers located at campuses of the University of California and the CSU System. We anticipate that our effort in Santa Cruz County will become a model for community colleges throughout California.

Part of that model is to encourage MESA high school graduates to continue their education at Cabrillo where classes are smaller, teaching is paramount, and costs are lower. Scholarships are a component of that encouragement. We propose:

Two Entering Student (from Watsonville HS) scholarships
Two Continuing Student scholarships

each in the amount of $250. This amount is about the cost of a student's textbooks for one year. Funds for the awards will have to come from external sources.

Knowing little about your Foundation I am uncertain of your special interests. However, if you share only a little of my excitement for what we are doing to make a difference in so many kids lives, I see two ways that the Louis R. Lurie Foundation could be involved in funding these awards.

One venue is to make a $1000 gift each year which would be fully expended that year. The other is to endow these scholarships by making an appropriate one-time gift which would annually generate $1000 of income to fund the awards. In both cases the funds would be handled on our end by the Cabrillo College Foundation. Our foundation fund is currently operating at a rate that would require an estimated $16,000 base to achieve the above.

We would arrange recognition of your participation in whatever way suits you, from being a silent partner to placing the Lurie name in all the appropriate locations in our publicity.

So, Bob, that's some of the story. It's certainly fun to have contact again after so many years, and to think that our MESA program might be something you would like to assist. Please call if you need more information, I'd be happy to personally present the story to you or your staff. Thanks for your consideration.

Sincerely,

Richard T. Hart

Enclosures:
1) MESA Highlights
2) MESA Annual Report 1990
3) MESA News, Spring 1991
4) Copy of 20th Anniversary Newsletter
5) Article from Education Week, 3 Apr 91
6) Excerpt from Cabrillo's MESA proposal
7) 1991 MESA Day program
8) 1991 MESA Day winners, Watsonville HS
9) Cabrillo College Foundation information

To Register your PACE Study Group

1. All Members should fill out a PACE information form.

At least one member of each group must qualify for PACE grant funding to assist underrepresented minorities (i.e. African-American, Latino, Native American or Filipino Students) and be enrolled in math, science or engineering courses.

2. Sign in the group on the list posted on the PACE door (Room 704).

If no one is available to sign in your group, you can sign up yourself by writing in your names in the next available space.

3. The Math Lab will have a copy of the list with your group number on it withing one day, so you can get free tutoring.

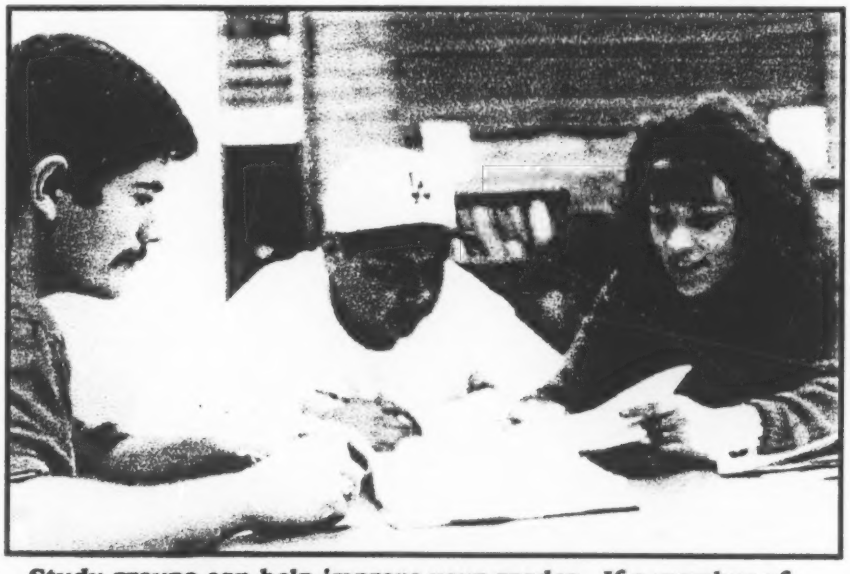
Note: Students in study groups will fill out a survey at the end of the semester, and grades of students in groups will be compared to students without groups. Generally, in comparable studies, students in study groups got higher grades and developed important skills that are useful on the job.

Study Groups Get Results!

A group of students studying together will earn higher grades than the same students working alone, according to a 12 year study at the University of Berkeley.

Dr. Uri Treisman wanted to help Black and Hispanic students to succeed in the studies of math and science. He knew that Chinese students were successful in mathematics, a subject that many non-Chinese minority students found daunting. What made the difference?

He found that the Chinese students formed what they called "study gangs." They met regularly, worked on problems together, talked and debated about them, taught each other what they knew, and helped each other figure out what they didn't know. When they couldn't figure it out, they went to a teaching assistant for help.



Study groups can help improve your grades. If a member of PACE is in the study group, you can get a free tutor from the Math Lab. (See p. 5)

The Black students, by contrast, had gotten to be achievers by operating on their own, isolated from peers. They didn't even think of forming study groups, and they didn't want to seek assistance for fear of appearing weak.

Dr. Triesman formed a Mathematics Workshop which he called an "honors" program, to remove any negative connotation to getting tutorial help. In fact, those in the program were the achievers who were willing to work hard to succeed, and to strive for honors-level grades.

The students were placed in study groups that met four hours for each class hour. An important part of the study group was learning to communicate with others about their efforts to develop solutions. By clarifying their own thinking, teaching and learning from others, they became much more clear about abstract concepts.

A graduate student was available to facilitate the study groups, helping them learn the skills to solve their own problems. This is a different skill than that needed by tutors, who tell a student how to solve a problem.

The Workshop (Study Groups) at Berkeley has been extremely successful. All students in the Workshop study groups earned a B or better in calculus; only 21 percent of similar students without the study groups earned comparable grades. Only 3 percent of Workshop students failed; 37 percent of non-Workshop students failed. Even students with poor SAT scores coming into the course were able to succeed.

The data suggests that these skills apply not only

please see **Results**, *p. 5*

Tutors and Study Groups

How to get help for math and physics classes

1. Go to the Math Lab (Room 712). Use the PACE sign-in sheet at the lab entrance. You can study there and raise your hand when you need help from a tutor. They're open 8:30 AM to 6:30 PM Monday through Thursday, and 8:30 AM to 4:30 PM on Friday. They will be open on weekends later in the semester.

2. Form a study group. Ask others in your class, and identify a time you can meet; register your PACE study group at the PACE office (Room 704.) (If you have trouble finding others for your group, the PACE office may be able to help you find PACE members in your class.) Meet at a regular time; you can work in room 710 or wherever you can find space.

3. Get a tutor/facilitator to help your study group. Go to the Math Lab and identify yourself by your PACE group number & meeting time; request a tutor. They will give you the name and phone number of a tutor qualified to work with you. You make the appointments for as often as you need them.

4. Get individual tutor sessions. If it is impossible for you to become part of a group, you may get an individual tutor by the same process as in #3 above.

How to get help for non-math classes

1. Check at the Math Lab (Room 712) to see if they have a PACE tutor registered for your class. If yes, the math lab staff will tell you how to get in touch with that tutor.

2. If not, ask your instructor for a recommendation on tutors qualified in your course. Get the name(s) and phone number(s).

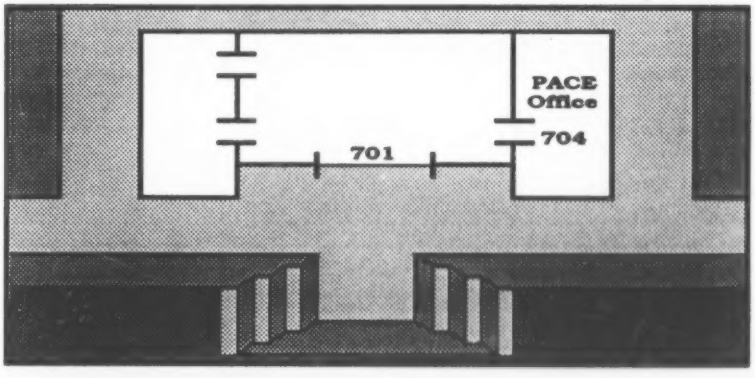
3. Contact the tutor and explain that they have been recommended by your teacher. Ask if they would be willing to tutor you in the course. (The pay is $7/hour.) Tell them the number of hours a week you would like right now, and how many hours you might estimate during the semester. If they are interested, ask them to go to the Math Lab to fill out paperwork at least two days before your first appointment so they can get hired and paid.

If you feel shy about contacting the tutors yourself, call 479-5734 or stop by the PACE office (room 704) and leave word with all the information in #2 and #3 above so we can contact the tutors and interview them first. Be sure to leave word when you are available to study with the tutor so we can schedule your first meeting.

Finding Your PACE

The PACE office is located in the 700 building on the Cabrillo College campus. In order to get to the PACE office in room 704, you must enter room 701. You will see the PACE office directly to your right.

The PACE office is open from 10:00 am to 12:00 noon on Wednesdays and 8:00 am to 5:00 pm Tuesdays and Thursdays.



Results

cont'd from p. 2

to math and science courses, or only to minority students. Every student can improve their performance if they are willing to invest the time to form, build and study with a group.

The skills that it takes to operate effectively in a group are useful in most job situations as well. Speech Communication 2, or Group Discussion, is a class available at Cabrillo for those interested in learning to improve their skills in the area of group dynamics and group learning strategies.

The PACE program for underrrepresented minorities (African American, Chicano/Latino, Native American, and Filipino) has funding to assist students in forming study groups. Contact 479-5734, or stop by the PACE office inside the Math/Science Division Office, Room 704. ■

PACE/MESA Program, Cabrillo College, MSE Division, Room 704, 6500 Soquel Ave., Aptos, CA 95003 Tel. (408) 479-5734

PACE INFORMATION

Name _____

Address _____
number and street *city* *zip code*

Phone (___) _____

- ❑ **I give my permission to release this information to other members of PACE.**

Ethnicity _____

Study Group

- ❑ I have a study group with ____ other people in _____
course name

  We plan to meet on _____
day(s) & time(s)

- ❑ I would like to join a study group for _____
course name

  I could meet at _____
day(s) & time(s)

PACE Meeting time: I would prefer to meet

- ❑ 7:15 - 7:50 AM Wednesday mornings
- ❑ Noon - 12:50 PM Tuesdays
- ❑ 6:00 - 6:50 PM Thursdays

College Interest: I am interested in possible transfer to

- ❑ UCSC ❑ Cal Berkeley ❑ Cal Poly ❑ _____

Career Interest: I would like to meet professionals in the field of

- ❑ Architecture ❑ Engineering ❑ Computer Programming
- ❑ Biomedical Research ❑ _____

Other Interests, Comments, Requests: I'm interested in

- ❑ Working with pre-college students ❑ Tutoring
- ❑ MESA Day Project ❑ Speaking at a MESA meeting

I'd like a PACE meeting on:

- ❑ Strategies for transfer to other colleges
- ❑ Job interview techniques
- ❑ Getting Scholarships
- ❑ Visiting CAL POLY
- ❑ Other (see reverse)

Math Learning Center

Monday, December 16, 1991

To: Susan Claire, PACE Director

From: Jazim Rubaii, M.L.C. Emir

Re: Role of the M.L.C. in the PACE program, Fall-91 semester

There were approximately 6300 students enrolled in M.S.E. courses in the Fall-91 semester. The number of eligible PACE students was approximately 700. Only 80 of these students were registered PACE students.

The M.L.C. provides drop-in tutoring to all Math students at Cabrillo College. PACE students were responsible for 1812 of the approximately 17,000 student hours of M.L.C. use. This averages to 26.3 hours per day. These drop-in tutees were both registered and unregistered PACE students.

In the Fall-91 semester all group tutoring of PACE students was managed by the M.L.C. This involved hiring, paying, and scheduling of appointments for tutors in Math, Physics, Chemistry, Oceanography and Accounting. The tutors for non-Math classes were referred by instructors of the respective courses. This limited our ability to replace the only recommended Chemistry tutor. The PACE students used a total of 229.5 hours of individual and group tutoring. This type of tutoring was provided on an appointment basis to any registered PACE individual or group. Unfortunately, of the 188 appointments made there were 33 no shows by students and 4 by non-math tutors. Perhaps a policy that contained penalties for missed appointments would be appropriate.

One of the M.L.C.'s instructional assistants escorted a group of PACE students to the Lockheed plant near Boulder Creek. Perhaps this visit helped Lockheed decide to donate $5,000 to the program.

The M.L.C. is currently operating very near its maximum capacity during peak hours. One cost effective way to alleviate the problem is the use of vacant classroom space for group tutoring. In this regard we are grateful that you had the foresight to reserve space for PACE study groups for the Spring-92 semester. The value of group study is widely recognized. Methods for forming groups will be discussed during the upcoming Flex week.

My observations as an instructor lead me to believe that the students targeted for the PACE program require a substantial amount of structure. It may be a good idea to place them into regulary scheduled group study and follow them through the process. One way to accomplish this goal would be a scheduled Basic Skills class associated with each Math class.

ERIC Clearinghouse for
Junior Colleges
MAY 15 1992